RAILROAD GAZETTE

FRIDAY, MAY 6, 1898.

CONTENTS

ILLUSTRATIONS:	PAGE.
The Railroad Arch at Niagara	319
Waterproofing and Drainage at the New South Terminal Station—Boston	320
Early Baldwin Locomotives on the Pennsylvania Railroad	321
Special Horse Car—Delaware, Lackawanna & Western	324
New Shops at Sedalia, Mo.—Missouri, Kansas & Texas Railway	325
Dining Car for the Cleveland, Cincinnati, Chicago & St. Louis	325
CONTRIBUTIONS:	
What is a Car Coupler?.	319
A New Specification for Steel	319
EDITORIAL:	
Taird Rail Versus Trolley in Connecticut.	326
Annual Reports—Lake Shore & Michigan Southern	327
EDITORIAL NOTES	326, 327
New Publications	327

GENERAL NEWS:	PAGE.
Locomotive Building	330
Car Building	330
Bridge Building	330
Meetings and Announcements	330
Personal	331
Elections and Appointments	331
Railroad Construction	332
Electric Railroad Construction	332
General Railroad News	333
Electric Railroad News	334
Traffic	334
MISCELLANEOUS:	
Technical	328
The Scrap Heap	329
The American Railway Association	320
English Electric Street Railroads	321
The Cost of Carrying United States Mails	322
The Motion of Locomotives and Cars on Tangents and Curves	323
Car Inspection	324
The Rhode Island Railroad Commissioners' Report	324
Foreign Railroad Notes	325

Contributions

What Is a Car Coupler?

The Lake Shore & Michigan Southern Railway Co.,
Cleveland, O., April 28, 1898.

To the Editor of the Railroad Gazette:

I notice that on the editorial page of your issue of April 22 you refer to the discussion which arose at the March meeting of the Western Railway Club in connection with the definition of the term "coupler" in certain sections of the rules.

From reading the comments I infer that you thought it was the endeavor of the club to give an official definition of the word "coupler" in the broad use of the word; such, however, was not the case. If it had been, the definition proposed by me would have been entirely inadequate. The vote passed was simply to define the meaning of the word "coupler" in Sections 35 to 43, inclusive, of the rules. In those sections if the term "coupler" was interpreted in its broadest sense and meaning, the rules would be made to have a meaning quite different from what it was intended by the originators of the rules, and in order to prevent this misinterpretation of the meaning, it seemed necessary to define the scope of the word where used in the above named sections of Rule 3. In other parts of the rules the word "coupler" would seem to carry with it a more comprehensive meaning, and would include the coupler casting proper and all its contained parts.

In the discussion Mr. Rhodes gave the definition of the word "coupler" in its ordinary use, but it would seem from his acquiescence in the limited definition suggested for use in connection with Sections 35 to 43 that he fully concurred in deeming it necessary to put a limited definition on the term in these sections.

A. M. WAITT,
Gen. M. C. B.

A New Specification for Steel.

Albany, N. Y., April 28.

To the Editor of the Railroad Gazette:

In "De Pontibus," by J. A. Waddell, we find a new specification for steel, which indicates an extensive experience and observation on the part of the author, and a careful study of the whole steel question. It is worthy of note that Mr. Waddell definitely repudiates Bessemer steel and allows only open hearth steel in structures built under his specifications.

The possibilities of the Bessemer steel have never been fully realized by the engineering profession, and never will now, since the superior open hearth steel has entered the competition, and the qualities of Bessemer can no longer compete. Our ideas of Bessemer steel are generally based on the ordinary 0.10 phosphorus product, or at the best 0.08 phosphorus, and without any reference to the sulphur contents. In the days when Bessemer steel was largely used by engineers the sulphur content was carefully guarded from them, and they were taught that the manufacturer would take care of that matter—which he did whenever the steel broke up in rolling. A very excellent low phosphorus and low sulphur Bessemer steel could have been made to advantage some years ago, but it can no longer, for a purer steel by the superior open hearth process can now be made more cheaply.

Mr. Waddell divides his steel into three grades, soft, medium and high, and for the two lower grades allows either acid or basic open hearth, but for the harder grades only the acid open hearth. This is a wise limitation, as the acid open hearth process is essentially a decarbonizing process and can be stopped at any desired point, thereby leaving the steel in a uniform condition in carbon, a matter of great importance where that element is high.

The basic open hearth process is essentially a dephosphorizing one, and as in common practice the carbon is nearly all reduced, it is incidentally a recarbonizing one as well. Carbon cannot be added to basic steel with the uniformity and certainty with which it can be left in acid steel, especially when the amount is large, and it is doubtless this distinction which has influenced the author in his limitations.

We see in this specification also that where both acid and basic steel are admitted the acid steel is allowed to run higher in phosphorus than the basic. It is generally assumed that this is to admit competition, but such is not the fundamental reason. Basic steel with no phosphorus whatever can be made about as cheaply as with a moderate amount, while every point that acid steel is lowered in phosphorus means an increased cost.

The fundamental reason for requiring a lower phosphorus in basic steel than in acid is that it must be lower in the basic in order to have an equivalent steel. This fact is brought out by two leading manufacturers of both kinds of steel in communications to the Iron Age of March 10, 1898, and is the first public admission of this important fact.

We find in this specification also that for material which is to be annealed or otherwise treated before use the tests may be similarly treated, but must give standard elongation, reduction and fracture before treatment.

In this provision we find a recognition of the fact that annealing may be used to cover up defects of manufacture or material, as well as to show the lowering of strength. If the treatment of the material was as good and uniform as in the test such a provision might not be necessary, but it is never the same, and if the material is inherently defective before treatment it should be known, as such defects may not be removed by treatment.

Many of our standard specifications are so far out of date that the poorest steel made at the present time will readily pass them, and even among many of the newer specifications little more than chemical and physical characteristics are provided for. In Mr. Waddell's specifications we find many conditions provided for, which, though important, have not heretofore been provided for, and its perusal or use will be valuable to the student or engineer.

A. C. CUNNINGHAM.

The Railroad Arch at Niagara.

The April number of the Transactions of the American Society of Civil Engineers contains a paper on the railroad arch bridge which lately took the place of the famous Roebling suspension bridge at Niagara. This paper is written by Mr. R. S. Buck, M. Am. Soc. C. E., Resident Engineer in charge, and is an excellent description of the bridge and the work of building. We shall not reprint much of it, for the subject matter is in the main already pretty well known to our readers.

In the historical introduction Mr. Buck says that in the winter of 1847 a contract was made with Mr. Charles Ellet to build a bridge on the site occupied by the present bridge. He threw across the gorge a cable of 36 No. 9 wires, on which a light iron carriage was run for about a year. The bridge was completed in 1848. This had no stiffening truss and had wooden towers. Mr. Ellet had nothing to do with the Roebling bridge.

In 1853 and 1855 Mr. John A. Roebling built the railroad suspension bridge. He had before this built six highway suspension bridges, but in developing his plan for a railroad suspension bridge he had to overcome a great deal of opposition. The bridge was built, however, and as all the world knows, stood for more than 40 years as a noble monument to Mr. Roebling's genius.

In 1877 some corrosion was discovered in the outside layers of wires in the cables at the anchorages and it was decided to replace the defective wires, and as the work proceeded it was further decided to reinforce the anchorages, which was done, increasing their strength about 50 per cent. All of this was done by Mr. L. L. Buck, and is a part of the well known and recorded history of the bridge. While engaged in this work Mr. Buck made a careful study of the problem of renewing the stiffening trusses, and in 1880 he carried out this work in a brilliant way, replacing the wooden trusses with metal, without interrupting traffic. The dead load on the cables was decreased 178 tons, which permitted the live load to be increased from 200 to 350 tons. In 1886 Mr. Buck replaced the original stone towers by steel towers, and finally there remained of the original structure only the cables, saddles, suspenders and anchorages. Ultimately, it was thought wise to replace the suspension bridge by a steel arch, and for this work Mr. L. L. Buck had been well prepared by his years of study. In 1882 and 1883, when the subject of building a bridge for the Michigan Central across the gorge was under consideration, he prepared a design and estimate for a spandrel-braced arch, but he had no opportunity to present this design to the bridge company and the cantilever bridge was built. After a careful consideration of the vibrations of the Rochester bridge (a three-hinged arch also built by Mr. Buck) he decided that it would be best to omit the center hinge in the Niagara arch.

"Yet his investigations showed that at Rochester, as probably in most cases, the vibrations seemed to a person standing on the structure to be much greater than they actually were. The results in this regard in the Niagara arch are very gratifying. Vibrations due to trains passing over at a rate of 20 miles per hour are scarcely noticeable, while the irresistible jog trot of a horse seldom produces the usual responsive swing. The stiffness thus attained, the author believes, has never been found in any other bridge of equal span. The calculated deflection under a moving load of 10,000 lbs. per running foot is $1\frac{5}{8}$ in., and the observed deflection under the test load, which was about 6,500 lbs. per running foot, was $\frac{13}{16}$ of an inch."

In the erection of the new arch one object was to maintain traffic, which was successfully done. Not a single train was delayed and the traffic on the highway floor was suspended only for about two hours a day while the upper floor system was being put in, and this was to prevent injury to people passing below.

"The deflection of the old bridge under moving load, the constant passing of trains, and the scant clearances at many points were considerations demanding close and constant attention; but as each anticipated difficulty was reached, it usually lost much of its formidable aspect. Besides, there was the comforting assurance that what had been accomplished with the old bridge under considerably less favorable circumstances ought to be accomplished again."

The method of erecting has been pretty fully described, but we reprint Mr. Buck's interesting account of the experience at the closing of the arch.

"The closure at the middle was anticipated with considerable interest and some anxiety. The absence of the center hinge rendered great accuracy in laying out the work necessary, in order to secure proper closure and distribution of load between the top chord and the rib.

"As a safety provision, the center panel top chord sections were not planed to length until six panels of the arch had been completed on each side, and a check measurement had been taken across the intervening space of about 134.5 ft. This measurement was not very satisfactory on account of the difficulties in the way of securing accurate results. The half spans were leaning back from their normal positions, their set and deflection could not be accurately accounted for, and the weather conditions were generally unfavorable. However, it was decided, after taking the measurement, to plane the center chord sections to theoretical length. When the center panels were erected, there remained an opening at the center of 8 in., due to the two halves of the arch being drawn back, to secure the necessary clearance for placing these panels.

"When all was ready, the adjusting toggles were slackened away together. In the proper order of events the top chords should have met first, and then, as those passed from tension to compression, the ribs should have met. But the reverse was the case, the ribs met first, and when the anchorages were entirely slackened off, there was an opening at the center of the top chord of ½ in. This indicated no compression in the top chords at the center, whereas there should have been about 350 tons. The cause or causes of the failure to close, were not, at the time, very obvious, but it was decided that the adjustment could be duly effected after casting off the anchorages. The anchorages were cast off and taken apart. None of the joints were riveted up at this time, but almost all holes were filled with drift pins and bolts. Certain of the rib joints were open, the bearing faces held apart by the drifts and bolts. When these were removed so as to allow the bearing faces to come together, the opening in the top chord at the center was reduced to ¼ in.

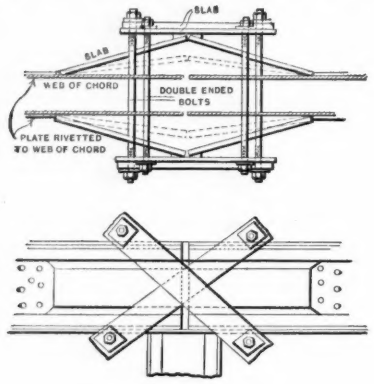
"It then became necessary, in order to secure the required compression in the top chord, to force it apart at the center and insert a shim. This was done by means of a compression toggle, improvised largely from material on the ground. The chords were forced apart until the opening was 1 in. wide, and a shim conforming to the section of the chord and of this thickness was inserted.

"Both before and after the top chords were forced apart at the center, levels were carefully taken at each panel point for the purpose of obtaining the exact camber. The results indicated a slight elevation of the camber over the whole span, after the adjustment, and in a closer conformity to the theoretical camber.

"After the adjustment was effected, and the end spans completed, the lower floor system was raised to its final position. Timbers were laid crosswise on

top of the roadway stringers, and when all was ready the stiffening truss was blocked up for its whole length on the new work. This was done between trains. The suspenders were then detached from the cables, and the cables were taken down. The wrapping was cut from the cables with axes, and the strands were cut at the shoes and lowered down, one at a time, on the bridge, where they were cut up for scrap.

"After the removal of the cables, the upper floor was put in. In order to do this the upper floor and



SKETCH OF
COMPRESSION TOGGLE USED
TO FORCE APART TOP CHORD OF ARCH AT CENTER.

top chords of the old bridge had to be removed. In order not to stop traffic this had to be done between trains, two panels at a time. The top chords and track stringers of the stiffening truss were cut into sections, conforming as closely as possible to the panel lengths of the new bridge, and the panels of the new bridge were put in as the sections of the old bridge were taken out.

"Operations began at the middle, and after the first day, when only one panel was placed, two panels a day were put in until all were in place. The time allowed for this work was about two hours each day, and the work was always done within the time limit. The same track alignment was preserved, and the same rails and ties were used temporarily after the new floor beams and stringers were in place. When this work was completed as far back as the shore ends of the end spans, the towers were taken down, a high gin pole being used to remove the caps and upper sections, and the traveler to remove the lower sections.

"After the removal of the towers, the new plate girder approach spans were substituted for the old ones. The maintenance of traffic here, while shifting, was more difficult than on the main and end spans, on account of the switches to be taken care of; but the change was accomplished without mishap."

The American Railway Association.

The official report of the proceedings of the last meeting of this Association, held at Louisville April 6, discloses a number of things which were not given out by the Secretary at the time of the meeting. (The report of the meeting was printed in The Railroad Gazette, April 15, page 272.)

The Executive Committee recommended that a circular be sent to owners of freight cars, other than railroads, calling attention to the requirements of the Federal coupler and brake law, many private companies having neglected to equip their cars with reasonable diligence. This committee also recommended, on the advice of the Car Servce Committee, that railroad companies and all car owners be requested to publish in the "Railway Equipment Register" all necessary information respecting their car equipment and line clearances, in order that the publication named may be a ready reference for authentic information on these subjects. (This information for the principal railroads is already published in the "Equipment Register," and this is a formal recognition of it.) The Executive Committee further recommended that a standing committee of five members be appointed by the President, to be called the Committee on Statistical Inquiry, this action being taken in view of the fact that much money is spent in compiling unnecessary statistics. "To this committee shall be referred all questions affecting the compilation of statistical railway information."

All of these recommendations of the committee were adopted by the convention.

The resolution to adopt as the rules of the American Railway Association the rules of the Master Car Builders' Association governing the loading of long lumber, etc., which was laid over from the October meeting, was again postponed to await further probable modification by the M. C. B. Association.

The Car Service Committee presented for discussion a resolution looking to the collection of mileage on freight cars carried on car ferries. The Managers of the Joint Traffic Association adopted such a resolution on Feb. 19. In this the rate was made the same as for the use of freight cars on railroads, but cars ferried across rivers or in harbors, where no mileage has heretofore been allowed, were excepted from the rule. On this resolution there was a long discussion, Mr. Ashley, of the Ann Arbor road, protesting strenuously against the adoption of a rule which would require him to pay mileage on cars carried by his company across Lake Michigan, 60 miles, while his own cars could be used for carrying freight 10 miles in New York Harbor, or 36 miles between Cape Charles, Va., and Norfolk, without payment of any kind. Mr. Ashley succeeded in staving off the adoption of the rule, and he attempted, but failed, to secure the adoption of a resolution calling for a report of all mileage for the month of October, 1897, for which the railroad companies had neglected or refused to pay. The object of this proposition was to show that difficulties in collection of freight car mileage on long belt line railroads are as troublesome as those connected with car ferries. It appears that the only car ferries on which it has been attempted to collect mileage are those running on Lake Michigan, but it is claimed that belt lines wrongfully evade the payment of mileage in many cities. The discussion was finally closed by the adoption of a resolution referring the subject back to the Car Service Committee with a request to review the question of per diem rates for car service.

The Committee on Safety appliances presented a report discussing the Federal law concerning car couplers and brakes, and especially the provision of the law which practically requires the use of train brakes which will work and readily interchange with all other brakes. With a view to insuring uniform practice the committee recommended a resolution "that this Association recommends to its members that they shall not apply to or use upon their cars any air brake apparatus that has not been submitted to and received the approval of the Master Car Builders' Assocation," and another that "this Association recommends to its members that they shall not apply or use any air brake apparatus that has not been submitted to such tests" (which the M. C. B. Association is prepared to make).

This report was at once vigorously challenged by Mr. Metcalfe, of the Louisville & Nashville, who contended that it was not properly before the Association because it had not been laid before all the members 30 days in advance of the meeting, and that it was not complete because it did not describe the proposed test for brakes; and he made a motion that action on the matter be postponed. The President held that the report was properly before the Association, and Mr. Metcalfe's motion to postpone was put and carried. A roll call was then asked for, and a long discussion ensued on the question whether this request was in order after the vote had been declared, and also on the question whether Mr. Metcalfe, Mr. Ashley and others could rightfully vote proxies for companies not represented at the meeting by their own officers. The President held that voting by proxy was not allowable, Rule 24 of the Association specifying certain officers who may represent a company and stipulating that "the official present highest in rank in any company shall cast the vote for that company." A vote was taken by companies and the convention overruled the President, the majority holding that the persons holding proxies were entitled to vote them. The demand for a roll-call on the question of postponing the committee's report was then withdrawn and the report was laid over.

The Committee on Safety Appliances presented a statement, made up April 5, showing the number of automatic couplers, air brakes and power brakes in service Jan. 1, 1898. This statement shows:

	Jan. 1, 1898.	Jan. 1, 1897.
Number of roads reporting	196	167
Freight cars in service	1,110,045	1,054,815
Fitted with air brakes	460,005	385,682
Percentage fitted	41.4	36.6
Fitted with standard automatic couplers.	674,675	517,617
Percentage fitted	60.8	49.1
Engines in service	32,771	31,590
Fitted with power brakes	29,827	27,458
Percentage fitted	91.0	86.8

The roads reporting had under contract Jan. 1, 14,717 new freight cars and 217 new engines, all of which were to be equipped with brakes and couplers in accordance with the law.

Waterproofing and Drainage at the New South Terminal Station in Boston.

As the great terminal station for the Southern roads, now being built in Boston, is situated close to the harbor, and the double deck arrangement places the loop tracks of the basement floor 8 ft. below high tide level, it has been necessary to provide for an extensive covering of waterproof material around all those portions of the structure and tracks which lie below the level of the highest tide. The method

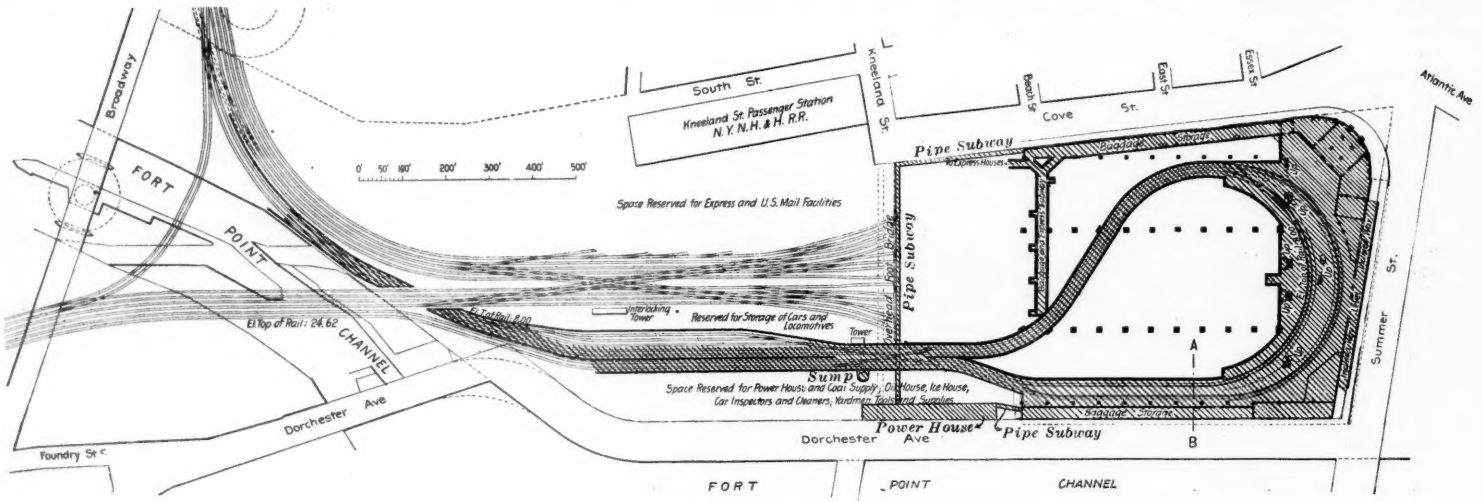


Fig. 1.—Plan of South Terminal Station, Boston, Showing Waterproofed Area Shaded.

adopted, although something of an experiment on so large a scale, has proved entirely successful, no serious difficulties having been encountered. This method illustrated in the accompanying drawings, consists essentially in tarred paper and coal tar pitch laid in sandwich between layers of concrete, as follows: Upon a foundation layer of concrete 6 in. thick, increased to 1 ft. or more where rendered necessary by the superstructure, were laid ten thicknesses of tarred paper. The top surface of the concrete was first troweled smooth with Portland cement, to prevent tearing or scratching the paper, and then swabbed with a suitable mixture of coal tar pitch. All laps were carefully swabbed and each successive layer of paper also carefully swabbed as placed, with the pitch, and the top of the top layer covered with a heavy coat of the same material. This entire work, together with the work of excavating and driving piles, was done in sections of convenient size with the water pumped out, and at the edges of each section the various sheets of tarred paper were lapped so as to form perfectly water-tight joints. The whole preparation of paper and coal tar pitch thus forms one homogeneous sheet, flexible and water-tight. Immediately over it was laid a first coat of concrete about 4 in. deep and then a loading of a cheaper grade of concrete 2 ft. 6 in. to 4 ft. thick; old steel rails being laid in the concrete beneath the loop tracks and in other places where necessary for strengthening. The waterproofing is also carried up the sides of the excavation in all places to a height above the level of the highest recorded tide; the exterior facing of the walls in this case being of brick instead of concrete.

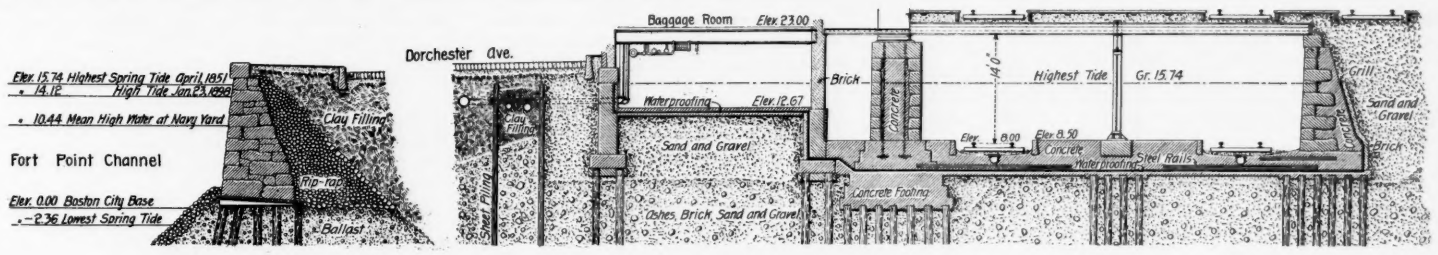
The area of waterproofing laid, including the sides, is 500,000 sq. ft., or about 11½ acres. It surrounds not only the loop tracks in the train-shed, the platforms

and the approaches, but also the baggage and pipe subways, part of the power-house and the inclines of the loop tracks, extending, for two of them, for a distance of over 1,700 ft. south of the train-shed, to where, after passing under the express tracks, they rise above high tide, as indicated in the plan, Fig. 1.

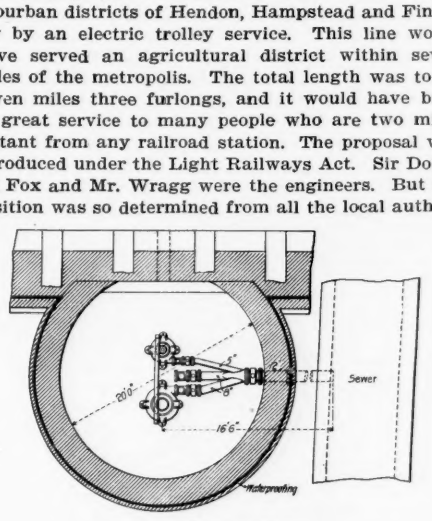
The drainage from the basin formed by the waterproofing is all carried, by drains between the tracks, to a point about 360 ft. outside the train-shed, on the east or sea side of the tracks, and close to the city sewer, which crosses the railroad grounds at this point and empties into Fort Point Channel. Here it is carried into a sump well 20 ft. in diameter, which is provided with two pumps of the centrifugal submerged pattern, one of 10 H. P., with a capacity of 1,000 gallons a minute against a head of 16 ft., the other of 30 H. P., with a capacity of 4,000 gallons a minute, against a head of 13 ft. 6 in. The former is intended to care for seepage, the latter for storm water. These pumps are placed at the bottom of the sump. They work on a vertical axis and each is direct-connected to a dust-proof electric motor of a new pattern. The discharge of the pumps is direct to the sewer, through a 12 in. straight pipe 7 ft. long, to which they are connected by a Y with three branches, the centre one of which is free. In all three branches of the Y are placed leather-faced check valves. When the tide is sufficiently low these checks are to act as automatic flood-gates to allow the drainage to pass to the harbor without pumping the centre branch of the Y providing an additional outlet when the effective head is small. Brass-mounted gate valves are placed in each side branch of the Y, and also one at the outlet end, to guard against flooding due to accident to the Y pipe or its connections and to afford opportunity for repairing the other valves.

Both pumps have cast iron cases and bronze runners mounted on vertical phosphor-bronze shafts, made in two sections for ease in handling. All joint-bolts in the pump-frame and elsewhere in the sump are of bronze, which will not corrode. A thrust bearing is provided on each shaft between the pump and motor. The control of the larger motor is by hand, but the smaller has an automatic controller operated by the rise and fall of water in the sump. The sump is provided with a high-water alarm which rings a loud gong in the engine room of the power-house, as long as the water is above a certain level, to give notice of the need of starting the large pump.

The waterproofing scheme, together with the plans for the sump and for drainage, was planned by Mr. George B. Francis, Resident Engineer. The work is part of the general contract of Westinghouse, Church, Kerr & Co., and it is they who furnish the design of the motors, controllers and details of construction.



Waterproofing of South Terminal Station, Boston.



Plan of Sewage Sump.

English Electric Street Railroads.

In the progress of electric traction in England, many of the tramway schemes will be condemned on trivial points. We suppose that in little-mindedness in discussing electric and other tramway proposals, it would be hard to beat many of the English local vestrymen and councillors. The English local authorities have such great control over the streets within their districts that unless in some way or other the promoters of street railroad schemes can early convince them of the advantages of new lines there is little hope of their ever getting beyond the promotion stage. Several important undertakings have since the beginning of the present year been nipped in the bud from no other cause than this.

One such was the Bournemouth and Poole and District overhead trolley lines. It was considered that the district being a select tourist part would not be improved from a visitors' point of view, that private enterprise of this sort was not to be encouraged, that the overhead trolley wires were objectionable and that there was little necessity for the undertaking, and the scheme fell through.

The introduction of electrical street railroads in London has been prevented primarily through the craze in favor of municipal instead of private lines. This feeling is extending to all parts of the country, and for a time, at any rate, will hinder the progress of private enterprise. Neither London nor its surrounding districts has a mile of electric tramway.

A recent proposal was set on foot for connecting the suburban districts of Hendon, Hampstead and Finchley by an electric trolley service. This line would have served an agricultural district within seven miles of the metropolis. The total length was to be seven miles three furlongs, and it would have been of great service to many people who are two miles distant from any railroad station. The proposal was introduced under the Light Railways Act. Sir Douglas Fox and Mr. Wragg were the engineers. But opposition was so determined from all the local authorities whose districts would have been traversed that the Light Railway Commissioners rejected the scheme.

Although municipalities have such great power, the Light Railway Commissioners can often overrule them. An instance of this arose quite recently in connection with the Leeds and Bradford light electric railroad line. It was proposed to run a light electric trolley line along the highway, promoting a rapid and regular service between the two towns. The opposition from the Leeds and Bradford municipal authorities was determined, as also was that of the railroad company responsible for the existing train service. In this case the Light Railway Commissioners overruled the objections and the scheme will go forward.

Another electric light railroad scheme which is also approved by the Commissioners is to connect Flamborough and Bridlington. Work is now to be commenced, the electrical part being provided by Messrs. Siemens Bros. & Co., and Messrs. Whittaker Bros. Mr. Bernard Drake is electrical engineer for the line, which will not only carry passengers, but will also help in the development of the fishing industry in those parts, the conveyance of such traffic being part of the company's business.

Most of the concessions which have been secured up to the present have been carried off by one company—the British Electric Traction Company—and there is little doubt that this will be the company to secure in due course of time some of the richest harvests which will be obtainable in electric tramway and railroad development. The company is not going in purely for new lines, but is buying up old lines from existing horse tramway companies and arranging for their electrical equipment.

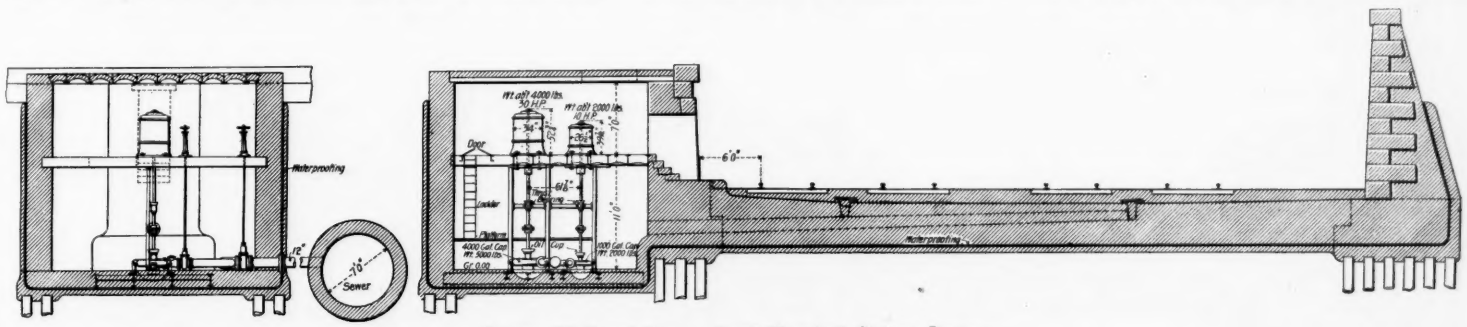
There is in course of construction at Liverpool at the present moment an electric trolley line which will run on to Dingle. The line will be opened for traffic on May 1. The corporation recently bought the street tramway systems and resolved to equip them for mechanical power. When the question of what power arose exhaustive inquiries were made, and it was resolved to equip an experimental line with the trolley. This is the Dingle line, and when this line has shown that the trolley is suitable for Liverpool all the other lines of the city will be similarly equipped. The corporation had previous to its decision on the tramway question purchased the city's electric lighting service, so that now the new machinery necessary for the tramway lines is being laid down at the Paradise lighting generating station and the armatures rewound to give the more powerful 500-volt current necessary for traction. The trolley poles have been specially designed for the corporation. Some of the cars have been delivered, and it is perhaps worth mentioning that their design is different from previous English practice. The cars will have entrances at the middle of the sides instead of at either end. The front part of the car is enclosed and comfortably fitted up with seats divided one from another by arms. The ventilating arrangements are of the latest type and the cars are electrically lighted. The rear half of the car will be open, and will take the place of the present "outside." The seats are arranged across, and each car carries 36 passengers. Up to the present the British Board of Trade will only allow a maximum speed of eight miles an hour on the street lines, though in some parts a movement is on foot to secure an increased rate. At Liverpool a special stopping station will be arranged for at the corner of each important cross street along the line of route, and the rate of speed, with stoppages, will be only eight miles an hour.

Work is proceeding on the Glasgow municipal experimental line, which is being put down for a similar purpose to the Liverpool one, to see whether the trolley will meet the needs of the city. Here the cars will be somewhat similar to those built for Liverpool, but instead of current being taken from the municipal lighting works which exist at Glasgow, a special power house is being built and equipped.

Sheffield is also laying down a short experimental trolley line, which will be worked municipally, the corporation here having likewise purchased the city tramways, but being questionable as to the most suitable motive power.

The rails are laid on a solid bed of concrete, bonded with Chicago rail bonds. There are 25 double-decker cars, each carrying 51 passengers. The electrical equipment is being supplied by the British Thomson-Houston Company.

The Bristol Tramways Co. was one of the first of such concerns to realize the advantages of electric traction, and over two years ago it equipped a seven-mile section with the electric trolley. The company raised a storm in electrical and engineering circles in England not a great while ago by abandoning its original English rope driven engines and dynamos at the power house in favor of American direct driven. This is the first direct-connected railroad generating plant in England. A short extension of three miles has been opened since the line commenced running, making the total length 10 miles of single track.



Sewage Well and Pumps, South Terminal Station, Boston.

Early Baldwin Locomotives on the Pennsylvania Railroad.

The accompanying illustrations show two types of locomotives built between August, 1853, and April, 1856, for the Pennsylvania Railroad Company by M. W. Baldwin.

The C engines were 31 in number and all except seven were used in freight service between Harrisburg and Altoona. The seven used in passenger service had smaller cylinders and fireboxes, but larger driving wheels, and were more elaborately finished. The cabs of these seven were of varnished walnut. Two of the first purchased were soon sold to the State, but came again into the company's possession at the time it purchased the State's improvements in August, 1857. Two of the lighter type were also among the engines owned by the State, thus completing the total of 31 of the Cs owned by the company.

The form of boiler will be noticed—small wagon top with standpipe bearing one safety-valve placed about center of wagon top; small dome on waist, midway between back head and smoke box, and mounted with safety-valve on cover and whistle on side.

The cylinders were placed at quite an angle, though not so great as those on the type E. Bells and headlight stands of all were fitted to frames and brackets of rustic design, and a similar type of bracket supported the projecting cab roof of the seven passenger engines mentioned.

Many of these engines were kept in service until 1873-4, a few until 1881 and but nine were broken up or sold previous to 1869. During their later years of service the safety-valves were taken from the dome covers and both were thereafter placed on the standpipe. The whistles were taken from the sides of the domes and placed on the covers. Link motion was also substituted for the hooks. In the case of one engine, No. 70, the small dome and the standpipe were removed and a larger dome with whistle and safety-valves on the cover was placed on the wagon top immediately in front of the cab. The Westinghouse airbrake was also applied to this engine; and as extension fronts had not yet come in, the main reservoir (of large size) was placed on top of the frame at the forward end between the bumper and the smokebox. The handrails were utilized as communicating pipes between reservoir and three-way cock. The outside frames were removed except a short piece from driver end of guides to front end of cylinders.

A few of the later built engines of this class were built with four-bar guides instead of two diamond bars.

The other engine is a Baldwin E. Four of this type were built for the company in February and March, 1854, and were used as helpers on the mountain until their rebuilding, about 10 years later. The eight drivers, it will be observed, although connected, had the forward two pairs fitted in Baldwin's patent truck, which enabled these wheels to move laterally in rounding curves, the driving boxes and rod brasses being turned vertically round on the sides and fitted into recesses similarly turned to receive them in the pedestals and straps, and the frames of these trucks being independent and connected to the main frame only by a pin and casing constructed with a view to this movement of truck.

The boiler and mountings were of practically the same type as those of the Cs before described, but cylinders were higher. Solid plate chilled wheels were used for a time in some of these, but it is most probable these were put in by the company after their purchase of the engines. The fireboxes, it will be seen, were built with bottom of mud-ring in line with center of drivers, an arch being made where it crossed the rear axle.

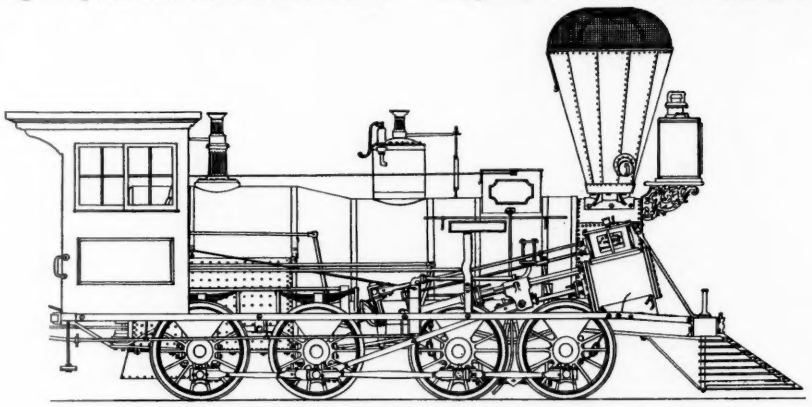
The principal dimensions of these engines were:

		C.	E.
Cylinders,	diameter	17 in.	19 in.
"	stroke	22 in.	22 in.
"	pitch	1½ in. in 12 in.	2⅞ in. in 10 in.
Drivers,	diameter	54 in.	44 in.
"	distances between centers	95¼ in	50 in., 66 in. and 54 in.
"	first to center of truck	137 in.	.....
Boiler,	diameter	44 in.	46 in.
"	back head to smokebox front	19 ft. 9¾ in.	19 ft. 9¾ in.
Firebox,	length outside	78 in.	78 in.
Weight	on drivers	34,400 lbs.	65,000 lbs.
"	" trucks	25,300 lbs.	.....
"	total	59,700 lbs.	65,000 lbs.

Both these C and E engines used M. W. Baldwin's variable cut-off, and pumps on each side driven from outside of crossheads. The E engines used single bar diamond guides.

The tenders of both C and E engines were alike, and were fitted with two trucks entirely of iron, having two pairs of wheels in each truck and a 28-inch half elliptic spring above each journal. Tenders and engines were painted in green and vermilion. Brass bands secured the Russia iron boiler and dome castings, while steam chests and cylinder heads were polished.

Two of the E engines were rebuilt in Mogul style at Altoona shops in 1865. The original boilers were retained, but the cylinders were lowered nearly to the center line of all the driving wheels. New frames held three pairs of 48-in. drivers placed close together between the cylinders and the firebox, and a pair of 30-in. wheels in a Bissell truck, between cylinder and bumper. The stroke also was increased to 24 in. by using thin pistons and decrease of clearance.



Baldwin Locomotives, Pennsylvania Railroad—Type E.

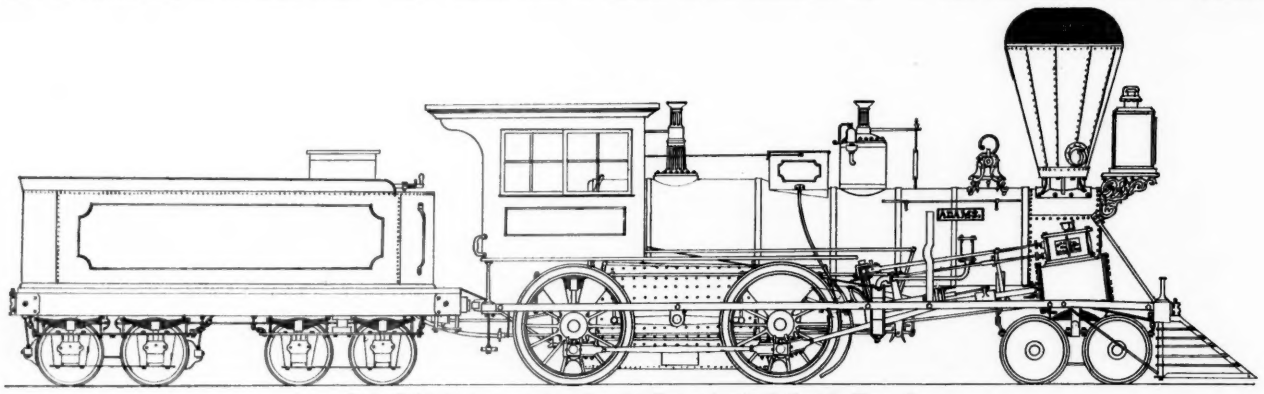
Four built, February and March, 1854.

The other two Es were rebuilt as saddle tank engines. The cylinders were lowered and stroke increased as in the first two, but the new frames used were fitted with four pairs of 48-in. drivers and spaced about 80 in. from first to second; 54 in. from second to third, and 102 in. from third to fourth. Firebox was made deep and extended downward between third and fourth pairs of drivers. A Bissell truck with a pair of 30-in. wheels was placed in front of cylinders with centers about 78 in. from centers of first drivers. The dome was removed to the wagon top and extended through a huge water tank, which occupied all the space between cab and smokebox. This tank reached 29 in. above top of boiler and 27 in. below it on each side. Laird stacks were used and their long saddle passed through the center of square sandboxes.

The cabs were 66 in. long, had a door on each side, and a huge coal bunker behind, underneath which was the toolbox. These four E engines were used in their rebuilt form as helpers on the mountain and later on the heavier grades of the branches constituting the Tyrone Division. The last one was retired from service about 1880.

C. H. CARUTHERS.

Adamsford, Pa., April 13, 1898.



Early Baldwin Locomotives for the Pennsylvania Railroad—Type C.

Twenty-four built from September, 1853, to March, 1856.

The Cost of Carrying the United States Mails.

Some interesting statistics on the cost of transporting mails by railroad have been placed before the Congressional sub-committee on the Post Office Appropriation bill (H. R. 9008). The committee has been engaged in considering the general question as to whether the present compensation for railroad mail service is reasonable. The sub-committee has now completed its work and the general committee recommend the appointment of a joint committee to consist of three members of the Senate and three members of the House, together with the two chairmen of the committees on post offices and post roads, to investigate during recess the question "whether or not excessive prices are paid to the railroad companies for the transportation of the mails and as compensation for postal car service, and all sources of revenue and all expenditures for the postal service and rates of postage upon all postal matter." The committee is said to have been impressed with the showing made by the railroads and by the Government officials in charge of the railway mail service, that the present compensation should not be reduced.

Representatives of some of the leading trunk lines appeared before the sub-committee and submitted a mass of figures showing that the revenue derived from the transportation of mail matter is in many cases less than the pro rata cost of the service which they are called upon to perform, and that it is much less than the revenue received from an equivalent carriage of passengers, express or high class freight. Representatives of the Post Office Department corroborated the figures submitted by the carriers.

Comparisons of the cost of handling mail matter with the compensation received were made by some of the lines as follows:

Atchison, Topeka & Santa Fe System, total receipts from mail for the year ending June 30, 1897, were $1,065,887. During this period mail was carried 8,724,433 miles and the actual cost of running the trains, including proportion of property and equipment charges, was almost exactly one dollar a mile. Exclusive of space in baggage cars used for pouch mail the space used for mail cars was 12 per cent. of the total, giving as the cost of the service $1,046,932 (12 per cent. of $8,724,433). In addition 725 square feet of space is furnished, running 2,598,920 miles per annum, without pay, on account of no appropriation being available. On the Cotton Belt road the receipts are $146,272 per annum and the expense of the service $192,533. On the Missouri, Kansas & Texas the annual compensation is $326,000; cost of service, $285,575. Louisville & Nashville, compensation, $699,264; expenses, exclusive of taxes and proportion of fixed charges, $515,120. If proportion of two latter items is added the service shows a deficit. The representative of the Pennsylvania, Illinois Central, Michigan Central, Lake Shore and New York Central roads submitted a mass of general statistics showing that the service performed was not overpaid. His summary shows:

Average rate per mile run, New York Central, for postal cars	$0.3388
Average (P. R. R.), Philadelphia to Pittsburg	.3284
60-ft. passenger car at full capacity would earn	1.20
At two-thirds capacity	.80
At one-third capacity	.40

Reference was made by all the roads to the fact that in considering the net revenue from the service, account should be taken of the cost of service between stations and post offices which the railroads are obliged to perform; the transfer of mails from one train to another, warehouse facilities provided, transportation of postal employees, etc. Regarding the cost of carrying mails to post offices the representative of the Atchison stated that there were 535 offices on its line where the railroad performed this service, the highest cost being at Kansas City, where it is $1,600 a year. The expenses of the Burlington for this service are $35,603 a year; Cotton Belt, $7,164. The Burlington pays $23,341 per annum for transferring mail from one train to another; the Maine Central, $12,925; Boston & Maine, $14,201.

Reference was made to the weighing of mails once

in four years and basing compensation for ensuing four years on such weighings, without regard to the natural or extraordinary increase during the term. The loss under the operation of this plan was estimated by some of the lines as follows: (For four years): Burlington, $300,000; Cotton Belt, $60,000; New York Central and Pennsylvania, $1,000,000; Southern Railway, $164,000.

Many comparisons were made between mail and express earnings. Neither the representatives of the roads nor the president of the Adams Express Co., who appeared by request of the committee, were able to give any estimate of the tonnage carried by the express companies owing to the fact that the express companies keep no record of weights of small packages. The compensation paid by the express companies is generally from 40 per cent. to 50 per cent. of the gross earnings of the business. The consensus of testimony was that, based on the amount of car space occupied by the Government and the express companies respectively, the express business gave the roads a much larger income than the mails. Further, the express service is performed at the convenience of the railroads; no special equipment is required, consequently no cars are idle at times, as is the case with postal cars; no portion of the car space is taken up with fittings, as in mail cars; the railroads assume no liability for injuries to express company employees, but are liable for postal employees; the express companies deliver their freight at the car, unload it and store it at their own expense, and the express companies pay a proportion of the salaries of many train and station employees, amounting to a considerable sum yearly.

Hon. W. S. Shallenberger, Second Assistant Postmaster General, and Mr. James E. White, General Superintendent of Railway Mail Service, both corroborated the statements made by the roads that the rate of compensation now allowed was not too high.

Referring to the fact that the mail service of Great Britain is conducted at a profit, as against a loss in the United States, Mr. Shallenberger said that he was satisfied after careful investigation that "the conditions of service in Great Britain differ so widely from the conditions here that, taking them into consideration, I am free to say that the comparison is decidedly in favor. of the United States." Touching the reduction in rate of pay for the service in the United States and the increase in the volume of business, he said that since the passage of the law of March 3, 1873, reductions had been made amounting to 15 per cent. in the amount of compensation paid the railroads. Under the sliding scale in use by the Government the rate for transportation varies from 5.85 cents per 100 lbs. when the average weight of mail is 200 lbs. to 3 mills when 300,000 lbs. per day are carried. The average paid for the use of postal cars is 4.9 cens per mile run. The reduction in rates for mail has been considerably greater in the last 15 years than the average reduction in freight rates during the same period. As illustrating the average reduction and increase in service, Mr. Shallenberger stated that on the New York and Philadelphia route, the largest route in the country, the average rate per ton per mile paid in 1881 was 6.4 cents; in 1897, 5.8 cents. In 1881 the average number of round trips per week was 107; last year, 299. He stated that it costs the Government over $1,000,000 a year for the transportation of mails to and from 7,000 post offices. On this basis it would cost the roads over $3,000,000 for the service performed by them. The requirements of the Government are steadily increasing, for the reason that the public are constantly asking for increased and improved service. The ordinary increase in postal service has probably been 12 per cent. each four years. The average cost per pound for the transportation of mail, including all contingent expenses, for both local and foreign service, based on the weighing of 1890, was 8 cents. Compared with passenger revenue, the railroads receive (based on estimates of Interstate Commerce Commission) 8 mills per 100 lbs. per mile for passengers, as compared with about 3.3 mills per 100 lbs. for mail. The Pennsylvania estimates 30 passengers per car and the average earnings from each passenger 1.84 cents. On that basis the revenue for a carload of passengers would be 58.2 cents per mile. Estimating the average load of a mail car at 4,000 lbs., which is large, the roads receive 12 cents a mile, plus 13.6 cents per mile for the car itself, or 25.6 cents per mile, as against 58.2 cents per mile for a passenger car in same train. The New York Central estimates 20 passengers per car, which gives a revenue of 38.8 per mile, as against 25.6 cents for mail. The roads will run a car for 18 full fares. On this basis they would receive 36.36 cents per mile, against 25.6 for mail.

Estimating the average compensation received for express service at 47 per cent. of gross revenue, and estimating the compensation for the mails on same basis, Mr. Shallenberger instanced comparisons on some of the principal routes as follows: New York and Philadelphia, annual compensation for mail service, $310,256, on basis of 47 per cent. of gross revenue would be $2,082,306. Philadelphia and Pittsburgh, compensation $736,587; 47 per cent. of gross revenue, $4,831,568. Philadelphia and Washington, compensation $252,866; 47 per cent. of gross revenue, $1,646,523.

In conclusion the following statement was made:

Senator Cullom: "From your study of this question since you came into office and from your study of the charges on express lines, and of the cost of the transportation of passengers, and of mails, on fast trains, state to the committee whether or not your conclusion is that the companies are not receiving for the transportation of the mails greater compensation than they ought to receive. Is that your conclusion?"

Mr. Shallenberger: "That, in the presence of this committee, would be my conclusion, very clearly stated. I have not so stated it to any of the companies; but, in the presence of this committee, I can state emphatically that I have been surprised to find that the rates allowed under the operation of the present law were less, proportionately, in my judgment, considering cost of service, than the rates of compensation allowed them by express companies or passenger traffic, and in some instances by high-class freight. I affirm that we are getting mail carried in some instances lower than the high-class freight on the same line."

Superintendent White fully corroborated Mr. Shallenberger's figures, and in addition submitted statistics in detail covering many independent routes. Taking some of the through routes he showed that the cost per pound per mile for transporting mail matter was as follows:

New York and Chicago, via New York Central and Like Shore, 1-324 of a cent. Chicago and Union Pacific Transfer, via Burlington Route, 1-335 of a cent. Union Pacific Transfer and Ogden, via Union Pacific, 1-290 of a cent. Ogden and San Francisco, via Southern Pacific, 1-273 of a cent.

Estimating the cost of hauling a 60-ft. postal car in a passenger train at 10 cents a mile, and the average haul as 250 miles a day, and adding cost of maintenance, gives $10,881 a year. The railroad company receives for hauling the car, independent of pay for transportation of contents, $6,250 per annum, being at the rate of $50 per mile of road on an average haul of 125 miles a day.

The Motion of Locomotives and Cars on Tangents and Curves.*

By A. Von Borries.

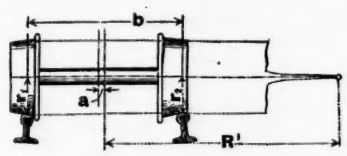
The quality of the motion of locomotives on tangents and curves, especially as regards the action of the forces which are developed, will be discussed in this section, collectively and in detail, to enable one to judge of the behavior of several designs as far as smoothness and safety are concerned, and of their effect on the track. Upon this as a basis, by a sort of reverse process, the adaptability of the locomotive, in whole and in part, to every serviceable end will be established.

On Tangents.

In consequence of the unevenness of the track, the play of the axles in the guides, the conical form of the wheel treads, the interaction of the heavy masses, and the elastic yielding of all parts, railroad cars, on a tangent, do not move strictly in the direction of the track, but swerve right and left, up and down, in such a way as to follow irregular wave lines. (Unless otherwise stated, cars constructed with rigid axles according to European practice, are referred to.)

At high speeds, the heavy masses of the cars are brought by these swervings to work together in a way to make the usual statical treatment of the active forces inadequate. The combined action of the external forces and oscillating masses must always be considered, and hence the investigations should be made rather from a dynamic standpoint.

A single free axle will continue to move in a straight course only while both wheels are rolling on peripheries of equal diameters. If a lateral displacement occurs so that the wheels run with different radii r_1 and r_2, then the wheel of greater radius r_1 runs forward, and the axle moves in a curve, whose



instantaneous radius R^1, shown in the figure, obtains from the proportion:

$$R^1 + \frac{b}{2} : r_1 = R^1 - b : r_2 \text{ or}$$

$$(14)\quad R^1 = \frac{b\,(r_1 + r_2)}{2\,(r_1 - r_2)}$$

If a is the amount of lateral deflection of the middle of the axle from the middle of the track, r the mean radius of the wheels, $\frac{1}{n}$ the cone-pitch of the wheel tread, then from (14) by substitution is obtained

$$(15)\quad R^1 = \frac{b\,r\,n}{2\,a}$$

The axle, then, is continually moving back and forth across, and to an extent, a, beyond the middle of the track, so as to execute in the latter's direction a series of long waves.

If the deflection, a, is sufficient to bring the throat of the flange in contact against the rounded edge of the rail head, r_1 is greatly increased by the continuation of this contact, while R^1 is correspondingly decreased; each wave thereupon contains a sharp curve at its apex, and becomes shortened in length.

The wear of the wheel-tread, which gradually changes its original conical form, affects the motion of the axle, and consequently the form of the wave line too much to make a theoretical calculation of this wave form at all satisfactory.

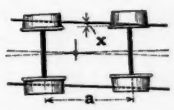
Axles, in running under the cars, can follow these wave lines only as far as the play and elasticity of the guides will permit. On the latter account each succeeding deflection becomes smaller than its predecessor, so that, in time, only such lateral movements of the cars, which are possible within the limits of that play, remain; these lateral movements in turn disappear, in a short time, in other irregularities of the motion.

Every car will run smoother the less the play in the journal box guides.

In locomotives, where this play is very small because of more careful fitting, the axles cannot follow this course, so that the very long zig-zag line, deviating to the right and left, which will be described, will hardly be appreciable. This motion, however, may be more or less disturbed by inequalities in the track and at high speeds even by inertia effects.

The Origin and Progress of Rolling.

The weight of the cars oppose the efforts of the axles to remain in their mid-position. If the flange of the left forward wheel—as shown in the cut—runs against the rail at an angle x, the front end of the car experiences a deviation, the amount of which depends on x. Thereupon the flange is pressed against the rail by a force which will be greater the larger the inertia of the car, the higher the speed, the less the lateral yielding of the journal box guides and the shorter the lever arm of the force, i. e., the distance the axle is from the center of rotation of the car. By this pressure against the flange the car is turned to the right about a point lying back of its center, and the energy of this motion increases until the sprung rails and guides have thus spent their resilience. This kinetic energy is still further increased, first by the front axle then by the back axle, because of their leftward deviation, striving to turn in the same direction. The rotating force, imparted to the car, does not permit it to come to rest in a position perpendicular to the track, but continues the oscillation to the right. In this way the front axle is shoved sidewise until the oscillation has been destroyed by the friction on the rail. The car now runs to the right, where the same action is repeated. This back and forth swing of the car on the track is called "rolling" [schlingern]. If one movement exceeds its predecessor the amount of rolling increases rapidly to the limit fixed by the above-mentioned play, etc.; if it be less the rolling disappears after a few oscillations.



Since the oscillations, depending in a certain way, as they do, upon the speed of the train, increase about as the square of this speed, there is for each car a certain speed at which it will commence to roll, started by a peculiarly strong deflection. Rolling, once established, continues until some external influence accidentally opposes a deviation and thereby disturbs the motion, whereupon the car will run quietly until another deviation of the required magnitude occurs.

Rolling easily causes derailment by the flange climbing the rail, an occurrence quite possible when an oscillation, magnified by some accidental circumstance, is combined with an imperfect spot in the track. It is, on this account, exceedingly important to understand the means of opposing rolling.

Angle x, for a given play, between flange and rail, is smaller, the greater the spread of the wheel-base a of the car. This, in itself, increases the lever arm of the opposing force which, in turn, is correspondingly diminished. Consequently, a lengthening of the wheel-base results in a diminution of both the kinetic energy due to the oscillation and the flange pressure. The same effect is also produced by a diminution of the car's corresponding moment of inertia, which compounded, to be sure, of two moments, one about a vertical, the other about a longitudinal horizontal axis, yet depends principally upon the former, by far the larger of the two. This diminution is obtained by limiting the length of the car and particularly by limiting the weight overhanging, front and back.

Hence to avoid rolling, it is only necessary to

*These articles are extracts from an important work, "Die Eisenbahn-Technik der Gegenwart," selected and translated for "The Railroad Gazette" by Mr. W. W. Nichols, Instructor in Mechanical Engineering in Yale University. Mr. Von Borries, as very many of our readers know, is Mechanical Chief of the Hanover "Direction" of the Prussian State Railroads.

See pp. 19 and 114 for earlier articles.

adopt a ratio of wheel-base to car length, which shall be greater the higher the required speed.

Play in the journal-box-guides, lengthwise of the axle, promotes rolling, because the latural fling is increased, and within the limits of the play there will be nothing to counteract the oscillation of the car. Play lengthwise of the car permits the forward axle to assume an oblique position, which causes it to run strongly to the other side, and thus aids the oscillation.

Locomotives, because of the smaller play in the jaws of their frames, can have a shorter wheel-base than cars.

In the case of axles, with which suspension links are used, when there is so much play in all directions that the journal-box-guides rarely come into service, the forces, which hold the axles in their mid-position, must be greater the higher the speed and the shorter the wheel-base.

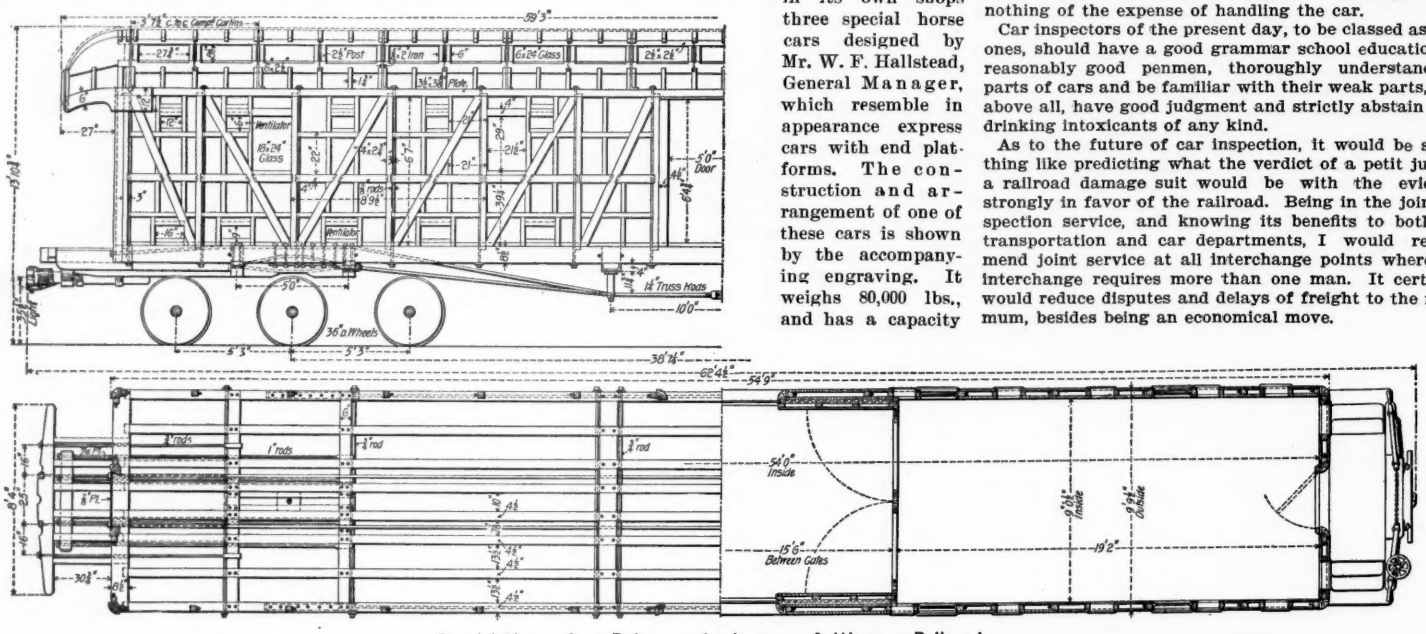
Cars with three or more axles roll and derail easier than two-axled cars of equal wheel-base, because the backward pitching of the car with a tendency to run on to the flange is resisted less by the action of the several forces developed by it, is so complicated and depends on so many circumstances that its mathematical treatment is not practicable. A detailed investigation of this sort is presented by Boedecker in "Rad und Schiene," Sec. 30.

Rolling is especially serious in locomotives. The large masses involved in its action makes it capable of injuring the rails and even of displacing the track laterally into a wavy line. Many accidents have been produced by its means. In English and American practice greater precautions have been taken to avoid rolling than in Continental practice in the case of the old three-axled locomotives.

The rolling described above should not be confounded with that oscillation both harmless and limited, about the perpendicular axis through the centre of gravity, which is produced by an imperfect balancing of horizontally reciprocating masses.

Special Horse Car, Delaware, Lackawanna & Western Railroad.

The Delaware, Lackawanna & Western is building in its own shops three special horse cars designed by Mr. W. F. Hallstead, General Manager, which resemble in appearance express cars with end platforms. The construction and arrangement of one of these cars is shown by the accompanying engraving. It weighs 80,000 lbs., and has a capacity for 40,000 lbs., the length inside being 54 ft., and the width 9 ft. 0⅛ in.

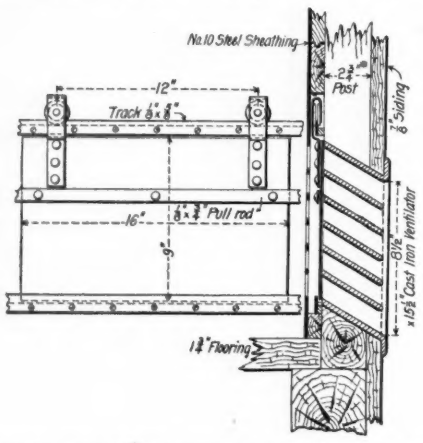


Special Horse Car—Delaware, Lackawanna & Western Railroad.

Doors are provided in the ends in addition to two side doors 10 ft. wide. Besides these openings, there are four windows and an upper and lower row of 10 ventilators each on either side in addition to the ventilators in the clear story; ventilators are also placed in the side doors and two in each end of the car. The ventilators in the side doors and clear story, as well as the side windows, are covered with galvanized wire netting of ¼ x ¼-in. mesh. The cast iron ventilators placed in the sides and ends of the car are shown in detail by the drawings, and it will be seen that small sliding doors hung on rollers permit closing these openings when desired.

The car is lined inside with No. 10 steel sheathing extending from the floor to a height of 4 ft. 6 in., where it is let in flush with the ceiling.

Standard six-wheel passenger trucks are used with 36-in. Boies steel-tired wheels, Westinghouse style of brake beams, Westinghouse air brakes and flange brake shoes made by the Ramapo Iron Works; Gould couplers and platform buffers are also used.



Section Through Ventilator—D, L. & W. Horse Car.

proportionately smaller load on the front axle. Cars of this class should have, therefore, a longer wheel-base than two-axled cars.

When the rails are slippery from dampness, etc., rolling occurs more readily than when dry, because, in the former case, the front axle's resistance to lateral displacement is less during the return oscillation.

Swivel trucks, notwithstanding their shorter wheel-base, have no tendency to roll, for their weights and moments of inertia are so small that they do not respond to the return oscillation when the forward axle is displaced. This can happen in such cases only when the preponderant mass of the car works to this end through the aid of a rigid pivot. It is, therefore, desirable to afford a side play in swivel trucks, and to maintain only sufficient stiffness to prevent the boxes pounding in their guides. The swivel truck can then experience small lateral movements without the car, as a whole, following it to any extent, which contributes considerably to the smoothness of running.

Since the centre of gravity of the car always lies considerably above the plane of the axles, the bearing-springs (elliptic) are brought into action during rolling, and their internal friction helps to diminish the motion's energy. Spiral springs, which do not possess this internal friction, are therefore unsuitable for high cars running rapidly.

On the whole, rolling, particularly as regards the

Car Inspection.

Mr. Charles Waughop, Chief Joint Car Inspector, East St. Louis, presented a paper at the April meeting of the St. Louis Railway Club entitled "Car Inspection—Past, Present and Future." Mr. Waughop stated that there were in 1874, in the strict sense of the term, few car inspectors in the country, and the inspection at interchange points was during this time and some years later more for safety than at any time since. The adoption of the M. C. B. Interchange Rules in 1877 was the beginning of rigid inspection. The following is taken from Mr. Waughop's paper:

"The framers of the M. C. B. Code of Rules, from their first issue to their last, have manifested a tendency toward Biblical matters, as the interchange rules have always been, more or less, written in parables, subject to different interpretations by different inspectors, as well as by the Master Car Builders themselves. It seems that the subject of plain and unequivocal language for interchange rules should be given much thought, and the rules written plain enough for all classes of car inspectors to understand them alike. The makers of the rules seem to have overlooked the fact that car inspectors, as a rule, are not college-bred men. You cannot hire brains for $45 per month and expect a man with them to give satisfaction as a car inspector.

Each year since 1877 the Master Car Builders' rules have been revised more or less, new conditions arising and general advancement making it necessary. The rules have been educators in several lines, especially in the universal use of terms for the different parts of a car. Advancing to 1881, we find the M. C. B. rules more rigid, and the inspection likewise rigid. It was then difficult to pass a car in interchange without pasting it with M. C. B. defect cards. At that time the St. Louis Bridge and Terminal Railroad was handling less than 500 cars per day, yet, owing to the manner of inspection, it required the services of a locomotive and crew and a switching crew of three men, who were kept busy setting out and returning cars to the various lines on account of trivial defects. This manner of handling bad-order cars was speedily changed by joint inspection. The difference between inspection in 1881 and at the present time can be better understood when we know that during the months of January and February, 1898, there were interchanged at St. Louis and East St. Louis, loaded and empty, upwards of 500,000 cars, and not one loaded car during this period was returned to the delivering line on account of defective condition of the car. We believe the transportation departments appreciate this—at any rate they should—for it means at least forty-eight hours' delay to any car returned to a delivering line on account of repairs necessary, to say nothing of the expense of handling the car.

Car inspectors of the present day, to be classed as good ones, should have a good grammar school education, be reasonably good penmen, thoroughly understand all parts of cars and be familiar with their weak parts, and, above all, have good judgment and strictly abstain from drinking intoxicants of any kind.

As to the future of car inspection, it would be something like predicting what the verdict of a petit jury in a railroad damage suit would be with the evidence strongly in favor of the railroad. Being in the joint inspection service, and knowing its benefits to both the transportation and car departments, I would recommend joint service at all interchange points where the interchange requires more than one man. It certainly would reduce disputes and delays of freight to the minimum, besides being an economical move.

I desire to call attention to one of the most extravagant features of railroading—that is, the non-adoption, by the Master Car Builders of standards for the different parts of cars. Personally, I can see no tenable reason why, in this age of steel, we should not have one standard truck for all cars of equal capacity; or, if one is not enough, have two or three. The same rule would apply to couplers. Say, they adopt five different patterns, and drop the other fifty-one different kinds on the market. The same idea could be applied with equal advantage to the other parts of the car, such as air brakes, body bolsters, etc. It costs approximately $3,000,000 per year for inspection of cars for wrong repairs alone. I believe this is a safe estimate, and this money could be saved if all cars were standard. Look at the millions of dollars lost by delays to cars in one year on account of holding cars on repair tracks, out of service, until proper material can be obtained from the owners, many miles away, to put the cars in serviceable condition, which material would be in stock if all cars were of the same standard. If cars were standard, I believe it safe to say that the railroads could do the business of this country with 300,000 less cars than they now have.

The car manufacturers would also be in a position to save a few millions of dollars in the reduction of prices for new cars. This they could readily do, when it is considered that if a standard were adopted it would be unnecessary for the car manufacturing companies to carry so many different patterns, which are necessary when so many different kinds and sizes of cars are built, each company having its own and different design.

Rhode Island Railroad Commissioner's Report.

Hon. E. L. Freeman, Railroad Commissioner of Rhode Island, has issued his annual report for the year ending Dec. 31, 1897, with statistics to June 30, 1897. The opening chapter of the report is taken up with a discussion of the general railroad situation throughout the country, with some consideration of the railroad problem as affected by recent experience throughout the world.

The length of railroad in Rhode Island is 503 miles, but the statistics are made up from the whole business of the companies reporting, which represents 2,559 miles. The commissioner has devoted considerable attention to the inspection of the station buildings on the railroads of the State. At Newport the buildings are "old, inconvenient and entirely unfit," but the officers of the railroad company have not found time to consider the question of their reneweal, and they "will not unless the people insist on something being done." At Carolina Mills a new station is needed, and the commissioner suggests that an expensive brick building in palatial style is unnecessary; one of wood, neatly designed, would do just as well. The number of bridges reported by the rail-

roads in Rhode Island is 253—21 stone, 81 iron, 148 wood and 3 combination. The number of grade crossings of highways is 240; of these 71 have gates, 88 flagmen, 9 automatic bells, 72 unguarded. Two employees and 13 other persons were killed on the railroads of the state during the year and 6 passengers, 45 employees and 26 other persons were injured.

There are eight street railroad companies doing business in Rhode Island, and the report gives statistics of the capital, traffic, earnings, etc., of each. The principal totals are as follows:

Street Railroads in Rhode Island, Year Ending June 30, 1897.

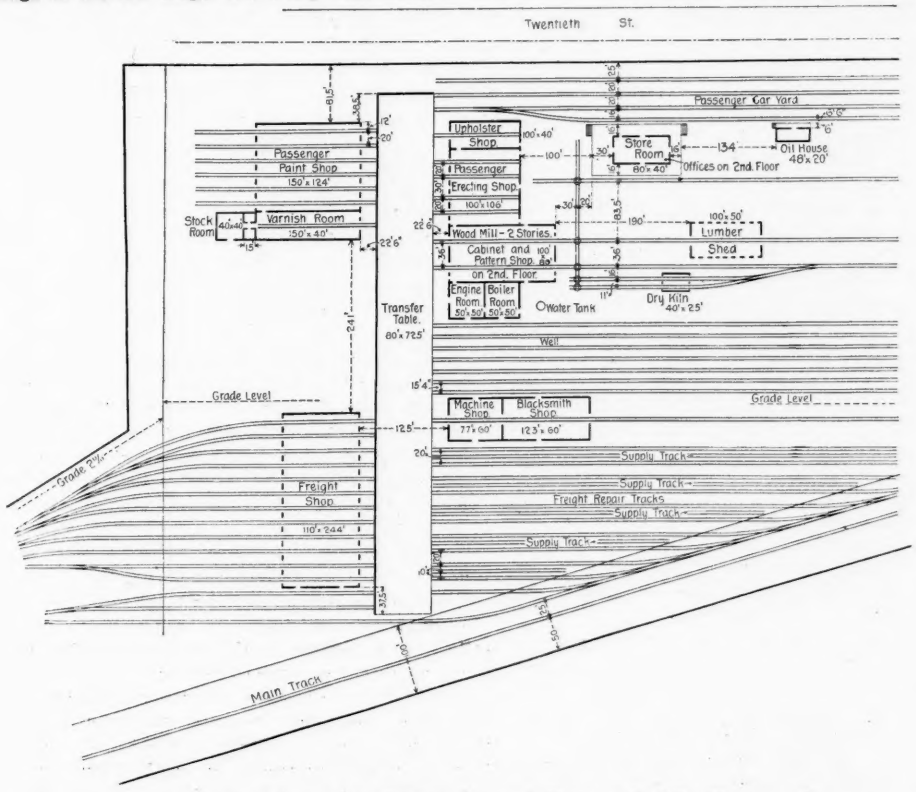
	1897.	1896.
Capital stock	$10,522,000	.....
Funded debt	622,200	.....
Floating debt	502,872	.....
Gross earnings	1,962,917	$1,940,738
Operating expenses	1,295,916	1,242,522
Net earnings	667,001	698,216
Length of road in R. I., miles	134	
Length of track, do	161	
Motor cars	561	
Other cars	131	
Passengers carried	38,769,424	

Commissioner Freeman discusses the subject of fenders for street cars, and he finds that a fender projecting in front of the car is of doubtful value and often dangerous in city streets where many corners have to be turned. Such fenders at many places sweep the corners of the sidewalk or strike vehicles which are well clear of the track. The Union Railroad Company of Providence has equipped its cars with a wheel guard which can be depended upon to keep persons from being hurt by the trucks, and if one falls alongside the car while trying to get on he cannot be crowded under the guard. This apparatus is automatic, and when in operation is always four inches above the rail. A "tripper" suspended from the under side of the platform is so connected with the guard that the instant an object comes in contact with the fender the guard falls to the rail. Six hundreds of these fenders have been ordered from the Parmenter Fender Co., of Cambridgeport, Mass.

An appendix to this report contains an article on the Railway Problem by Hon. Lloyd Bryce, reprinted from the North American Review.

New Car Shops at Sedalia, Mo.—Missouri, Kansas & Texas Railway.

The engraving shows the plan of the tracks and buildings of the car shops now being built at Sedalia, Mo., by the Missouri, Kansas & Texas Railway. This road has small car shops at Sedalia, and the new shops are intended to take the place of the old ones at that point; more work also will be done in the new shops than has heretofore been done at Sedalia.



New Car Shops of the Missouri, Kansas & Texas, at Sedalia, Mo.

The new buildings proper cover an area of about 2½ acres, while the area of the shop yards is about 40 acres. The several buildings are arranged with reference to carrying on the work systematically and economically and are served by a transfer table which will be driven by a 30-H. P. electric motor. All the shops are fitted with water pipes and are connected with an ample system of sewers. All the buildings are built of brick, one story high, except the wood mill and the storeroom, which have two stories. The dry kiln has double 8-in. brick walls with an intervening air space 2 in. wide, and the lumber shed is a frame structure resting on a foundation of posts. The water used about the shops is obtained from a 6-in. drilled well near the boiler room, 285 ft. deep.

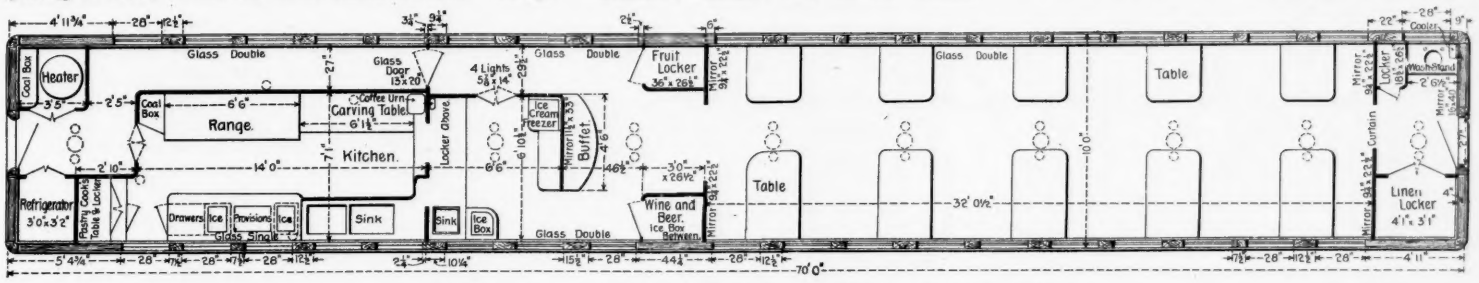
The boilers are to be of the return tubular type of 400-H. P. capacity, and built by the railroad company. The engines and pumps will be taken from other shops on the system, while all the machinery in the present Sedalia shops will be used and additional machinery and tools purchased.

The contract for the grading was awarded to George T. Menefee, Sedalia; that for the foundations, sewer and water supply to J. W. Thompson, St. Louis, Mo., and J. A. Daly, Nevada, Mo., was the contractor for the erection of the buildings.

The new shops when worked to their full capacity, will give employment to about 250 men. The plant will have a capacity for building 24 freight cars and 6 passenger coaches at one time, in addition to the usual repair work. The cost of the Sedalia improvements will be approximately $150,000. For the drawings and data presented we are indebted to Mr. S. B. Fisher, Chief Engineer, under whose direction the shops were designed and are being built.

Dining Car for the Cleveland, Cincinnati, Chicago & St. Louis.

The accompanying engraving shows the floor plan and arrangement of a new dining car to seat 30 people, built by the Barney & Smith Car Manufacturing Company for the Cleveland, Cincinnati, Chicago & St. Louis Railway. The car is 70 ft. long, 10 ft. wide, with inclosed wide vestibules, and is mounted on six-wheel trucks. The interior finish is mahogany inlaid with colored woods, all surfaces being smooth and free from molding and carving; the broad deck, with a continuous headlining the full length, gives the car a wide and light appearance. The tables are the usual size, while the chairs are movable, made of cane unholstered in leather, and are smaller and more comfortable than the usual heavy movable chairs or than stationary seats. The exterior of the car also presents plain surfaces, no moldings being used except at the door posts, thus facilitating the cleaning of the car. Pintsch gas is used for lighting and the steam heating equipment is the Gold system, with duplex coils. The car is also fitted with Buhoup platforms and Buhoup three-stem couplers.



Plan of Dining Car for the Cleveland, Cincinnati, Chicago & St. Louis Railway.

Foreign Railroad Notes.

There has been recently in German journals considerable discussion concerning intemperance among railroad men, and it is urged that serious efforts should be made to prevent it. The German trainman has great facilities for getting drams. A very large part of the stations have bars in the waiting rooms, and railroad men often have to wait for an hour or two, sometimes all night, at such places, arriving, perhaps, tired out or chilled through. The third class waiting room is the place prescribed for them to sit, and this is very much like what staying in a barroom would be here. It is urged that such places should be compelled to keep non-alcoholic drinks and good cheap food, and some go so far as to say that fewer stations should be provided with buffets. That where there are buffets the sale of liquor might be prohibited seems to be unthinkable.

There is a society of women in Berlin whose object is to give advice to girls coming into the city to find service as to safe places for them to stay, etc., to prevent them being led astray. In the prosecution of their mission they have had placards printed giving a list of homes, etc., for girls in the city, and have put them into all the railroad stations and into 16,000 fourth-class and 21,000 third-class cars. This has come to the attention of a society of agriculturists in East Prussia, where complaint is bitter that the emigration of the young people to the cities makes it difficult to get hands enough to cultivate the soil, and where not so long ago the laborers were still so far attached to the soil that they could not leave their native parishes without permission. This society has demanded the removal of these placards from stations as incitements to the depopulation of the country!

The Chinese ticket agents need big cash boxes. The money commonly used is the copper "cash" of different values, so that from 12 to 20 of them go to make a cent. These coins have a square hole in the centre, and usually 250 of them are strung on a string and these strings are hung on the arms. A European at the Pekin station reports: "Two Chinese ahead of me bought tickets, each worth about 700 or 800 cash. Two men at the ticket office took the money, looked to see if counterfeit pieces were in the strings; found some on each string, which the purchasers replaced with loose pieces from their pockets; were astonished at my impatience and gave me in change for my dollars two strings of cash, probably the same they had just taken in with the counterfeits on."

With the completion of the Ussuri Railroad, extending from Vladivostock northeast to the Amoor River at Chaparovsk, about 450 miles, it is reported that through freight service will at once be established from Western Russia to the Pacific. This can only be done by a long wagon haul east of Lake Baikal in connection with a still longer steamboat service on the Amoor, but the report that it will be done is serious enough to induce the Austrian consul at Moscow to refer to it. He says that by one report the charge through from Moscow to Vladivostock will be at the rate of $12 per 100 pounds; by another report half as much. At either rate it is not likely that the railroad or the steamboats will be overburdened with freight.

Earnings per passenger mile are given in the last report of the Hungarian State Railroads, for the first time, we believe, since the introduction of the zone system. The average for all trains was 1.051 cents in 1896, and 0.966 cent in 1895. On express trains (which carry scarcely any third-class passengers), the average was 1.716 cents in 1896, and on ordinary and mixed trains, 0.997 cents. The average third-class rate was 0.912 cent.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.

Published Every Friday,

At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

Governor Black of New York has signed the bill requiring 500-mile tickets at two cents a mile to be sold by all railroads on which the regular local fare is higher than that rate, and not over three cents; thus, by a single stroke, reducing the fare for a good share of the passenger trips of all important roads in the State, except the main line of the New York Central. The law requires the railroads to accept these tickets from the purchaser's family and employees, thus making them practically good for any person presenting them, so that in many localities scalpers will be able to use them, if they find it worth while to take the necessary pains to avoid being arrested for violating the law prohibiting brokerage in tickets. This law is simply a severer application of the revenue reduction embodied in the 1,000-mile ticket law of two years ago, and by reducing the minimum expenditure from $20 to $10 it may easily double the number of two-cent rides sold. The Erie road contested the constitutionality of the 1000-mile law, and its suit is now pending in the Court of Appeals. It is fair to presume that this new law will also be fought unless its validity is settled by the suit already begun. The law is vicious in two features: It is too sweeping, reducing fares on many short trips where three cents, or even four cents a mile would be a reasonable rate, and it legalizes the wholesale principle in a wholly illogical way. It makes a discount, not on that portion of the business which the railroad can conduct more cheaply, but on an entirely different principle; on the business of passengers who have the most ready money; presumably those who can best afford to pay a higher rate. It is a discrimination against the poor man, whom politicians and legislators are supposed to love. It is true that the railroads first set the example, and that but for this example our legislators might never have known anything about mileage tickets; but that does not change the character of the law. The courts, however, have great respect for precedent, and this precedent in railroad practice may be just the thing which will lead to the approval of this law in the Erie's suit. The best argument that the road could present would be evidence of a decided ill-effect on its revenue, but quite likely this cannot be done, for the reason that on a portion of the business the change may not be unprofitable, and the court, acting on the principle that the state must have large liberty in regulating fares, will hold that a loss on short trips is obliterated by a gain on long ones, and that, therefore, the state's action is a "reasonable" regulation.

An annoying feature of this 500-mile ticket law is that requiring the railroads to accept coupons on trains instead of making the passenger go to the station ticket office to exchange his coupons for a card trip-ticket. Railroad officers who have had most experience with mileage tickets have long since concluded that the acceptance of one-mile coupons on trains fosters a great deal of fraud, and all honorable conductors oppose their use; but the drummers—or those of that class who do the most talking before legislative committees—are persistent in their demands, and the Legislature and the Governor have yielded to them. Representatives of the Conductors' Brotherhood made a strong protest at Albany, but it appears that it had no effect; and it would not be surprising if the conductors should make the matter a political issue when next they vote for Governor. One of the worst frauds against railroads is that effected by collusion between dishonest conductors and dishonest passengers. Passengers who travel over a given road often enough to be well acquainted with the conductors are tempted to corrupt them, and experience shows that the temptation is often yielded to; and, as things are, mileage tickets are found a most convenient instrument for working the fraud. Legislators are readily made to believe that if a railroad suspects its conductors of dishonesty it ought to be able itself, unaided, to find means of detecting the wrong doers, and that the demand for consideration at the hands of the law makers is unreasonable; but, we repeat, as things are, the mileage ticket is a promoter of fraud and the demand for freedom from the conditions imposed in the mileage ticket law is reasonable. If tickets could everywhere be collected before passengers enter the car, the railroads might be blameworthy for not adopting more businesslike methods, but collection in that way seems hardly feasible on heavy local trains.

The New York, Ontario & Western has taken the bull by the horns without hesitation. It has reduced all fares to two cents a mile, thus exempting itself from the requirements of the mileage book law. At the same time the company has withdrawn all round-trip, twenty-five-ride, and other reduced rate tickets, thus making a slight advance on some tickets to partially offset the loss (of one cent a mile) on those for single trips. This must produce a material reduction in the road's revenue, but there can be little doubt that the traffic will increase enough to restore the gross passenger earnings within two or three years. Possibly it may sufficiently increase within one year, though the long stretches of rather sparsely settled country through which the road runs are somewhat discouraging. Ticket sales to large towns within a half-hour's ride are the kind most easily increased by a reduction of the price. Just how much the Ontario's gross earnings will suffer it is hard to tell, for the published reports do not separate the earnings on three-cent tickets from those on other rates. The average receipts per passenger mile last year were only 2.07 cents. As the through travel, both first-class and emigrant, brought in only $75,270, as compared with $563,390 from local, the emigrant passengers cannot have had a great influence on the average, and the difference betwen the local rate (three cents) and the average total receipt (2.07 cents) must have been caused largely by round-trip sales and summer excursions to picnics and the like. The report says that during the year 175 excursions were run, carrying 40,242 passengers, with a train mileage of 6,609, bringing in $29,942. As the average receipt per pasenger on these excursions was thus about 74 cents, and the average length of the excursions (round trip) was 38 miles, the average rate per mile per passenger was very nearly equal to the average on all passengers for the year. Regular round-trip tickets have been, we believe, about two cents a mile, so that it would seem that the volume of three-cent fares was not so large but that the small emigrant travel balanced it. But emigrant rates are very low, and with commissions deducted the receipts are, no doubt, extremely low, so that probably one emigrant would reduce the average more than one three-cent fare for the same distance would raise it. The striking feature of the Ontario's passenger statistics is the small average net receipt per passenger per mile, only .067 per cent. (Receipt, 2.072; cost, 2.005). A passenger has to be carried fifteen miles to produce a profit of one cent. If the cost has been correctly computed, it is plain that the Legislature's act will, temporarily at least, compel this road to take a part of its earnings on freight, express and mail, to pay the cost of carrying passengers. The average receipt per ton per mile on freight last year was less than nine mills; net, 2.94 mills.

Third Rail Versus Trolley in Connecticut.

The present situation in Connecticut forecasts some important and not remote events in the rivalry of third rail electric lines with the trolleys. For a number of years the New York, New Haven & Hartford (Consolidated) Railroad Company contented itself with resistance to the "trolleys" in the legislature and the courts. In the legislature it succeeded in blocking some of the most dangerous projects; in the courts it succeeded in obstructing others. But in the most prolonged and bitter of the legal contests, that relating to the trolley parallel between Hartford and New Britain, the steam company after years of litigation was forced last year to yield; and, of late, in two other, the Southport and Westport extension and the important Sheleton street railroad parallel, the steam company has been defeated absolutely. There is now pending in the Connecticut courts but a single case involving the public "necessity and convenience" of a trolley parallel, namely, the suit to be tried in a few days relating to a projected trolley parallel between the cities of New London and Norwich, about twelve miles.

Up to about one year ago the Consolidated Company had opposed successfully almost all the inter-urban trolley projects in a State containing eighteen cities, with probably about 462,000 population, or, say, 57 per cent. of the population of the whole State. But, within the last year, five inter-urban trolley lines have either been built or are building, and of these, four have been authorized after steam-trolley contests in the courts.

Included among them is the Southport & Westport extension of the Bridgeport Traction Company—a line which, while not strictly inter-urban, will close a trolley gap between the city of Bridgeport and the cities of South Norwalk and Norwalk. Within twelve months twelve Connecticut cities have been actually or potentially connected by trolley roads, as compared with but two cities previously so connected, not counting two cases where cities in the State—Derby and Ansonia and the two Norwalks—are so closely joined as to form, in effect, single municipalities.

But the Consolidated Company had anticipated these results. It knew well enough that the aggressive trolley must be fought in the end by agencies more physical and concrete than court decrees and legislative bills. The third rail was a possible expedient for meeting the electric foe with his own arm, and the third rail between Hartford and New Britain was laid and the line opened for business eleven months ago.

What the returns will be for the completed year cannot be positively stated. But we have the official record from May 24, 1897, up to Nov. 1 of the same year. Before the third rail line was opened there had been running daily between New Britain and Hartford eight passenger trains each way, carrying a daily average of about 750 passengers at an average fare of 18 cents each way. On the third rail the fare each way was reduced to 10 cents, and the trips were every half hour from 6 a. m. to 11:30 p. m. The daily average from May 24 to Nov. 1 showed 2,587 passengers and $258.70 per day by third rail, as compared with 750 passengers and $135 per day by steam. The figures must be taken with some qualifications. They include, for example, the "novelty" period, when many passengers rode on the third rail as a curiosity; and it was some time after the opening of the third rail route before the trolley parallel between New Britain and Hartford began its rivalry. Moreover, the cost of operation, including interest on plant and allowance for renewals, is not yet disclosed. But, with all due reservations, it is pretty obvious that the Consolidated Company has not merely held its passenger traffic between New Britain and Hartford, but made a positive gain, and its half-hour service is soon to be increased to a service every fifteen minutes. It should be added that the third rail has endured the test of a New England winter, on the whole, considerably better than the trolleys.

Whatever the results may be in terms of precise figures, that they are satisfactory to the Consolidated Company is indicated by the vigor with which it is pushing through the Bristol extension of the third rail, which will be in operation within a few weeks. Unlike the New Britain-Hartford line, the extension will be in the nature of a "cross-country" road. It will be about nine miles long, and will connect New Britain, not with another city, but with Bristol, a borough factory town containing in the whole township a population of 7,382 in 1890. The extended third rail will compete with an existing cross-country trolley of about the same length. The enterprise will involve a new second track for a distance of several miles, with costly rock cutting, and, even allowing for economy of operation from an existing power house, prospective local patronage is inade-

quate to explain the project. It suggests, rather, a reaching out to a new electrical center of the Consolidated Railroad system, presumptively Waterbury, whence by a new power house could be operated third rails on the Watertown branch, the discontinued Waterbury and Meriden line, and a part of the Naugatuck division, now subjected to sharp trolley competition by the Waterbury Traction Company.

Reports have recently been circulated of plans of the Consolidated Railroad Company for laying a third rail on the New Haven and Derby road, now the southern terminal link of the Berkshire division of the corporation. It is a single track road, about nine miles long, with large passenger and freight traffic between New Haven and the closely joined cities of Derby and Ansonia and the Borough of Shelton, with a total population in the three municipalities of about 25,000. Strenuous efforts were made at the last two sessions of the Connecticut legislature to secure working charters for a trolley parallel of the Derby road, and were defeated with some difficulty by the Consolidated Company, which undoubtedly recognizes the fact that the short line is a pretty vulnerable part of its system. By a power house at Derby, where the Consolidated Company already owns land well adapted for a union station, that corporation can operate not merely a third rail upon the Derby road, but the lower Naugatuck division in competition with the Shelton street railroad, soon to be built in connection with the Bridgeport traction system, of which it is, to all intents and purposes, a branch line. A new third rail electrical center is thus forecast at Derby, and three power houses—at Berlin, Waterbury and Derby—will permit not merely third-rail operation between Hartford and Waterbury, but of practically the whole Naugatuck division as an offset to sharp trolley rivalry present or soon to come.

This prognosis of third-rail extension and competition with trolley roads, which would supply some instructive facts as to the new rivalry, is only qualified by existing uncertainties as to the distance of third-rail operation from a single power house. That at Berlin will operate the third rail to Bristol for a distance of about eleven miles in one direction.

There are in Connecticut other interesting phases of the situation, most of them relevant to steam-trolley rivalries. Within a few months there has been a revival of trolley construction. There are at present somewhat more than fifty miles of trolley roads, including extensions, either under construction or with right of way purchased, which are likely, within a few months, to add about fifteen per cent. to operated trolley mileage in the State. Of these about one-half will parallel steam roads. The coming electrical equipment of its New Canaan branch by the Consolidated Company—practically an extension of the Stamford trolley system owned by that corporation—is of interest, as it is to be used for motor car freight service, and the results used as a test for electrical freight traffic on other parts of the Consolidated system. The plan of the Philadelphia, Reading & New England for a composite car steam service between Hartford and Tariffville—in effect a suburban service—is also noteworthy. Such a service between Hartford and New Britain, instead of the third rail, was strongly advocated by C. S. Mellen, then Vice-President of the Consolidated Company and now President of the Northern Pacific, but he was overruled.

A matter, however, of far more moment in the State is the possible, if not probable, reversal by the Supreme Court itself of its decision against the additional servitude of trolley roads laid upon highways. The original finding was made by a majority of a single judge, three opposing the additional servitude, and two, including the Chief Justice, vigorously asserting it on the most radical grounds. At the time when the decision was rendered it was pointed out in the columns of the Railroad Gazette that a change of the composition of the court might reverse its finding. Since then Judge Fenn, one of the majority judges, has died; a judge has succeeded him, and now a new case is before the tribunal, in which the Consolidated Railroad Corporation pleads additional servitude in a contest with the Fair Haven and Westville Trolley Company. Moreove Judge S. E. Baldwin, one of the majority judges and the one who wrote the majority opinion, retired from the case—which was argued last week—considering himself disqualified as a stockholder of the trolley company, and Judge Prentice, of the Superior Court, sat as a substitute. By the rule of numerical, if not legal, chances, therefore, Connecticut seems likely to reverse her old position and join the States where the courts have asserted the additional servitude of electric roads. Such a finding in a commonwealth where street railroad questions have been many, complex and very fiercely contested, would be of uncommon import.

Annual Reports.

Lake Shore & Michigan Southern.—The annual report of the Lake Shore & Michigan Southern Railway to Dec. 31, 1897, was made public this week. We discover that gross earnings increased about ½ of 1 per cent., to $20,297,722. Operating expenses decreased 1.34 per cent., and net earnings increased 4.44 per cent., having been $6,755,231. The increase in gross was entirely in freight, namely, 3.35 per cent. The passenger earnings fell off 6 per cent. and other earnings nearly 3 per cent. Furthermore, the gain in freight earnings was due entirely to greater tonnage. The tons moved increased from 13,662,000 to 14,037,000; the length of haul increased from 174 miles to 176.2, and the ton-miles increased 4.06 per cent., to 2,473,436,580. Therefore in spite of a decline in the ton-mile rate (from 5.49 mills to 5.45 mills), there was a gain of 3.35 per cent. in freight earnings.

The rate per ton-mile is the lowest in the records of the company; which fact might have been stated for any one of the last 28 years, except that the phenomenal year 1885 came in to introduce into the column of ton-mile receipts the entirely irregular figure of 5.53 mills. The cost of carrying freight, however, has also fallen, and last year it stood at 3.56 mills per ton per mile, which is the lowest cost which the company records. Thus, the profit becomes 1.89 mills, the highest profit shown since 1888, when it was 2.06 mills. In the year 1885 it fell to 1.54. It is not necessary to stop here to point out how the Lake Shore is able to do its freight business at a rate so low and still make money. This story has been often told in the last few years.

In passengers carried there was a slight decrease in numbers and also in passenger miles. In fact, so few passengers have not been carried in any one year since 1888, and the passenger miles are the lowest since 1894. The passenger mile rate was 2.018 cents, which is the lowest on record for this company, except the rate of 1.988 cents in the abnormal year 1881. The cost per passenger per mile, of course, has not been reduced anything like the cost of hauling freight, and the profit, therefore, has fallen off. Last year it is estimated at 6.11 mills, considerably less than in any year preceding, going back 20 years or more, except in the year 1892, when the profit is put down at 6.03 mills.

We have said that the net earnings were $6,755,231. Fixed charges were paid to the amount of $3,009,972, leaving a surplus equal to $7.57 per share of stock. Out of this surplus, dividends were paid at the rate of 6 per cent. to the amount of $2,967,990, and the balance carried to the credit of income account was $777,269. For the last eight years the stock has paid 6 per cent., and every year for the last 28, except in 1885, it has paid some dividend. In seven of those years the rate was 8 per cent. and in 11 years it varied from 2 per cent. up to 5. Of course, this annual report repeats the remarkable statement which has stood from year to year, namely, that the capital stock of the company has remained unchanged since 1871, standing at $50,000,000. Furthermore, notwithstanding the great expenditures on construction and equipment, these accounts still stand as in 1883, at $84,000,000.

The funding operations of last year are too fresh in the minds of the reader to need more than mere mention. Old issues bearing 7 per cent. interest, to the amount of $21,393,500, have been exchanged in advance of maturity for the new 3½ per cent. 100-year, gold bonds. The company's funded debt has been increased in this operation $3,731,500, but the annual interest charge is less by $618,170 than it was Jan. 1, 1897; and so, physically and financially, this property stands as one of the best railroad properties in the world.

The Century Magazine for May contains a careful review of the highway grade crossing problem by Franklin B. Locke, who gives a summary of the most important improvements of this kind that have been carried out in the past 10 years. In England, as is well known, the railroads were originally planned with a view to avoiding the crossing of streets and highways at grade, but in Germany, according to Mr. Locke, there were 1½ grade crossings per mile of railroad as late as 1892. The disaster at Steglitz, where 37 passengers were killed by an express train at a station, led to immediate action in the direction of reform in the cities and larger towns. As long ago as 1883 the sum of $5,900,000 was appropriated for the abolition of crossings at Cologne. In Germany the expense of important works of this kind has generally been borne by the Government. Mr. Locke has made inquiries in other countries of Europe and finds the theoretical regulations similar to those in Germany and England, but they are not rigidly enforced, because trains do not run so fast. Coming home to America, Mr. Locke discusses the disadvantages of our large railroads which enter thickly settled cities, and seems to think that if they had got rid of their grade crossings, so that passenger trains could make better time, they would have sufficiently satisfied the suburban passenger traffic to have prevented in large measure the competition of electric street railroads, which has so greatly injured the older established standard railroads. This looks like a pretty broad conclusion from only a part of the obvious premises. The latter part of the article reviews the action of Massachusetts, Connecticut, New York and Michigan, looking to the abolition of grade crossings, and very briefly notes what has been done in Boston, New York, Philadelphia, Chicago and Detroit. The author finds that the railroads of Great Britain have cost about $114,000 per thousand of population, while those of Massachusetts have cost about $70,000; from which he concludes that if all the grade crossings in Massachusetts were abolished (at a cost of $40,766,000, the sum estimated by the special commission of 1888) the total expenditure on the railroads of the state would still be less than $90,000 per thousand of population, and that therefore the abolition of the crossings would be justifiable financially. If all the railroads of Massachusetts were controlled by the state, or by a single company, so that the populous sections could help bear the burdens of the country towns, this calculation might hold; but taking the situation as it is, those railroads which have scores of crossings but no credit on which to borrow capital with which to change the grades, will probably have to continue to lament that they are too poor to be economical. The illustrations with Mr. Locke's article are interesting, but scarcely instructive; though the view of boys and girls playing on a five-track crossing in Worcester, Mass., will probably be of interest to European readers.

NEW PUBLICATIONS.

A Treatise on the Locomotive Engine. By Maurice Demoulin. With an introduction by Edouard Sauvage; 4 volumes, large octavo, 1,978 pages, 973 engravings in the text and six plates. Paris: Baudry & Co., 15 Rue des Saints Peres, 1898. Price, 150 francs.*

In his introduction M. Sauvage says "we may put nearly all books in two great categories, and especially scientific and technical books; first, those in which the reader can find what he is looking for, and second, those in which he can't. Books of the first class one loves to find under his hand and studies with pleasure, and these he takes up when a difficulty arises; the others sleep on the shelves of the libraries which they burden with a slumber that is rarely disturbed." Monsieur Demoulin's book he places without hesitation in the first category. "The abundance, the variety and the novelty of the arrangements decribed and shown by engravings in this book make it a necessary part of the library of those who wish to seriously study locomotives, of those who build them and of those who have to organize locomotive service." By a judicious selection of examples Monsieur Demoulin gives a clear idea of what the locomotive is to-day, and this he examines in all its details. Those exceptional arrangements which use has condemned are not mentioned, unless they offer a special scientific or historical interest. On the other hand, "devices actually in use are largely shown in all their characteristic points."

Probably this estimate by Prof. Sauvage is a just one of the place which this book will take in the extensive literature of the locomotive. Monsieur Demoulin has been sparing of doctrine and opinion, but profuse in examples of practice. He has ranged the civilized world and collected information from all countries where locomotives are used, and this information he presents with that sense of order and arrangement which seems to be born in a Frenchman. His scheme is comprehensive, logical and systematic. The value of the book, then, depends upon the intelligence and fidelity and industry with which the facts have been gathered and presented, and these qualities are in no degree lacking in the work.

Under the author's general plan the work is divided into three principal parts, although there are four volumes. These are Part I., a study of the principal types of locomotives; Part II., combustion, steam making and the use of steam; Part III., proportions, the methods of construction, general arrangement and details of locomotive parts.

Part I., which is also Volume I., takes up first a general examination of locomotive types. The author classifies locomotives in several ways; first, with regard to the different services for which they are designed, and second, according to the arrangement of their principal organs and parts, and

* Traité Pratique de la Machine Locomotive contenant les Principes Généraux Relatifs à l'Etude et à la Construction des Locomotives, la Description des Types les plus Répandus, l'Etude de la Combustion, de la Production et de l'Utilisation de la Vapeur, du Rendement, des Conditions de Fabrication et de Réception des Matériaux, des proportions et du Mode de Construction des Organs. Par Maurice Demoulin, Ingénieur des Arts et Manufactures. Ouvrage Précédé d une Introduction par Edouard Sauvage, Professeur à l'Ecole Nationale Supérieure des Mines. Quatre volumes grand in-8°, avec 973 figures et planches dans le texte et 6 planches hors texte. Prix relié: 150 fr.

finally according to the number of coupled axles. Under these classifications he gives a hasty general view of the locomotive field; then in the second chapter he examines the principal types of locomotives used in France, and in the third chapter, which closes the volume, the principal types used in other countries than France. The United States and Great Britain naturally fill an important part of this chapter, about two-thirds of it, in fact; but the locomotives of Belgium, Switzerland, Germany, Austria-Hungary, Italy, Russia and several of the smaller countries are shown. The general scheme of treatment is to take up typical locomotives, to show them in outline, giving a few of their principal dimensions, and frequently by perspective views from photographs. This volume closes with a number of important tables collected so as to give comparative figures of dimensions of all the principal parts of many different locomotives. One of these tables gives comparisons for locomotives, simple and compound, designed and used in different countries, of cylinder surface and cylinder capacity, of the ratio of heating surface to cylinder surface and the ratio of heating surface to cylinder capacity; of the ratio of firebox heating surface to the heating surface; of the tubes and of grate surface to the total heating surface; of tractive power and of the ratio of tractive power to the weight on the driving wheels.

In developing the theory of the types the author notes the uniformity of English engines in general appearance, and particularly the uniformly good coal used, which results in large evaporation per square foot of grate area and heating surface. To this general cause is ascribed the relatively light weight of English engines, and their small boilers and grate surface. Mr. Demoulin notes that English locomotives can develop 500 to 600 chevaux, indicated, per square meter of grate area. Therefore, English designers have not tried to make locomotives with the large grates used in Belgium and elsewhere. His admiration of the beauty and smoothness of outline of English locomotives we quite share, and we are inclined to think that the handsome lines of many recent American engines are largely due to the influence of British example. Concerning American engines the author observes that we try to get the utmost service out of each machine by double crewing, thus increasing the commercial value of each. To him our ideal seems to be to have as few engines as possible and to replace them frequently, and this practice he judges has led to a rapid development of powerful modern locomotives. He discovers that we have made great progress in recent years in the art of arranging the external parts, and thus our locomotives have become models of symmetry and massive elegance.

Part II., as we have said, is devoted to combustion, steam making and the use of steam. The author makes a special reference in this to the researches of the French engineers, Henry and Baudry, and to those of Prof. Goss. In the chapter treating of the theory of combustion he takes up air admission, the method of firing on different railroads and in different countries; various designs of firebox and firebox linings and methods of using liquid fuel. Different examples of firebox arrangement are shown by illustrations.

The boiler is then considered as an apparatus for the exchange of heat and the production of steam. The efficiency of the heating surface is studied and the difference between direct and indirect surface, and tables of value are given and losses of heat traced. Tables of experimental results with different sizes and lengths of tubes are given, and in this direction the French experimenters have surpassed all others. Some of the most valuable of the recent French experiments were collected and discussed in the Railroad Gazette a few years ago. In this same chapter the influence of increased draft upon steam making is considered and the loss of efficiency due to extreme forcing. We know of no other treatise in which this subject is so thoroughly and satisfactorily covered.

Another chapter of this volume treats of the losses in the cylinder and of improvements which tend to economy in the use of steam. Thermo-dynamic efficiency, internal and external losses and condensation are treated with references to the experiments of Hirn, Isherwood, Clark, Thurston and others. Various forms of valve gear and their efficiency are taken up, with statements of the results of French trials of Corliss and other independent valves; and the valve gears themselves are described and shown by engravings.

Naturally, this division of the subject covers the compound locomotive, which the author discusses with moderation and breadth of view, as well as with much information. He concludes that the 4-cylinder type of compound cylinders, acting on two separate coupled axles, has the maximum advantages. This conclusion will probably be questioned by American locomotive designers.

In taking up the useful work done data are collected concerning tractive power and coal and steam used per horse power, and a comparison is made of the efficiency of the locomtive and the stationary engine. Comparative tables of horse power per unit of weight are given for several English, French and American engines.

In Part III. the author first takes up boiler and firebox design. Here the proportions and the limitations imposed by the arrangement of the machinery are discussed. The proportions with reference to the fuel to be used and to the service to be performed are also studied. Heating surface and its proper relation to grate surface and to the amount of steam and water space is carefully considered. Tables are given of the proportions of many locomotive boilers. This chapter, which covers 232 pages, is an admirable study of the principles which govern the design of locomotive boilers.

Next the author takes up the materials used in boilers and fireboxes, and then he considers the details of construction. This chapter is very thorough, goes into great detail and is admirably illustrated.

Other chapters are devoted to the general design and arrangement of machinery—cylinders, rods, valve gear, etc., with the proper dimensions of steam ports and passages.

One chapter discusses the general arrangement and details of the locomotive considered as a vehicle, and this naturally takes up frames, spring rigging, journal boxes, drawgear, wheels and axles, tires, truck construction, etc. The part of this chapter relating to spring construction and the tables of springs are very complete.

A chapter of 210 pages describes the accessories and miscellaneous parts of locomotives, covering fire doors, smokebox fronts, ash pans, grates, draft appliances, safety valves, injectors, etc. A well illustrated section of 48 pages is given to draft appliances, exhaust pipes and the like used in various countries. These examples are well chosen and interesting, but apparently the design recommended by the committee of the Master Mechanics' Association, now so widely used in the United States, was developed too late to be included in Mr. Demoulin's examples. Some foreign designs, incorporating nearly the same features, are, however, shown. It is interesting to see the extended use of the ejector form of stack, showing that experiments made under widely different conditions have indicated that this is the best.

A number of pages, with 23 very clear illustrations, are given to cab arrangements with the location of injectors, boiler head fittings, etc. Only two of these are from American practice, and the illustrations from foreign practice indicate that these features receive more careful attention than with us, and that the fittings are applied in a more workmanlike way. This chapter ends with some remarks upon the interchangeability of parts among different classes of engines, and mention is made of the high development of this feature in English practice. While acknowledging the importance of interchangeability, however, it should be remembered that undue attention to this may lead to neglect of other important considerations and may prolong the life of antiquated designs. Nothing in locomotive designs demands better judgment than deciding when interchangeability should be sacrificed to other requirements.

One chapter is given up to a thorough discussion of lubrication, with illustrations of apparatus, and another relates to tender construction and copuling arrangements between engines and tenders, etc.

The two pages of general conclusions, which end the treatise, are a tribute to the locomotive as an efficient machine for its work, and, like the introduction by M. Sauvage, give strong reasons for the continued general uses of the steam locomotive as against other motors.

Appendixes to the extent of 109 pages give specifications of contracts from French, English, Belgian and American practice. These specifications are given in full, the American example being the modern New York Central fast passenger locomotive.

It is difficult to know where to stop in reviewing a book so admirable as this. Mr. Demoulin has laid the railroad engineer under a great obligation, and it is a pity that an edition of the book cannot be brought out in the English language. Probably, however, this could not be wisely done as a purely business venture.

TECHNICAL.

Manufacturing and Business.

At a meeting of the A. & P. Roberts Company, held in Philadelphia April 26, the following officers were elected, the change being occasioned by the recent death of Perceval Roberts, Sr.: President, Perceval Roberts, Jr.; first vice-president, P. W. Roberts; second vice-president, Frederick Snare; secretary and treasurer, J. W. Davis. Mr. Snare, second vice-president, will continue to have his headquarters in New York City.

At the annual meeting of the stockholders of the Joseph Dixon Crucible Company, held at the company's main office, Jersey City, N. J., Monday, April 18, the Board of Directors, consisting of Edward F. C. Young, John A. Walker, Daniel T. Hoag, Richard Butler, William Murray, Alexander T. McGill and Joseph D. Bedle was re-elected. President E. F. C. Young, Vice-President and Treasurer John A. Walker and Secretary Geo. E. Long were re-elected by the Directors. Judge Joseph D. Bedle was also re-elected as counsel.

An example of dispatch in filling orders is found in the fact that in 9 days from receipt of order the Lidgerwood Mfg. Co., New York, furnished ammunition hoists for the ships Yosemite and Dixie, being fitted out at Newport News as auxiliary cruisers. The order consisted of 10 complete hoists, comprising double cylinder engines, cages, guides, sheaves, etc.

The Shelby Steel Tube Co., Cleveland, O., has recently secured a large order for boiler tubes from the United States Navy Department. These tubes are of seamless cold drawn steel, No. 9 gage, 2¼ in. in diameter, and are upset on one end. It is understood that this order comprises a full set of tubes for all of the boilers of the Iowa, Brooklyn, Cincinnati and Bennington and a partial set for the Texas, which are to be delivered within 60 days. Of late years the Navy Department has used charcoal iron tubes in the standard boilers of the Scotch type, and only recently have the Government specifications been so changed as to admit steel tubes in competition.

The National Electric Car Lighting Co. is equipping with its system one sleeping-car for the Wagner Palace Car Co., and also Chauncey M. Depew's private car.

The Watts Iron & Steel Co. (C. P. Perin General Manager), Middlesboro, Ky., is in the market for two second-hand locomotives for yard work, standard gage.

The Hancock Inspirator Co. of Boston, Mass., has moved its New York office to 121 Liberty street.

The Directors of the Bethlehem Iron Co. have adopted a resolution to the effect that any of its employes who desire to enter the service of the country in the army or navy and return with honorable discharges, will be re-employed, if capable of performing the duties of the position.

The Superintendents of each department of the Cambria Iron Co. have received an order to hold open for any of their employes who will enlist in the army or navy and return with honorable discharges the positions they are at present filling.

The Southern Pipe Co., the successor to the Anniston Pipe Co., whose works were burned down several months ago, has commenced operations at Anniston, Ala. The plant has been rebuilt on a large scale.

It is stated that the Eagle Foundry Co. of Greensboro, N. C., will build a new foundry.

Iron and Steel.

The Southern Bolt Co. has been organized at Birmingham, Ala., to make steel and iron rods, bolts, nuts, etc., for bridge work, etc.

A deed from the West Superior Iron & Steel Co. to the Wisconsin Steel Co. has been filed. The authorized capital of the new company is $5,000,000. F. W. Gates, Chicago, is President; H. W. De Forest, New York, Vice-President; Edward V. Carey, Secretary and Treasurer; Geo. W. Murry, General Counsel.

According to press despatches, the Bessemer pig iron producers of the Central West have agreed to bank their furnaces for 30 days out of the three months of May, June and July. As a guarantee that the plan will be followed out, each producer will put up a $25,000 forfeit. About 18 furnaces will be affected.

New Stations and Shops.

The Western Maryland has completed plans for the building of shops at Hagerstown, Md.

The contract for the foundation of the new Pittsburgh & Lake Erie trainshed to be built at Allegheny, Pa., has been let to Grady & Coda. The shed will be completed by Sept. 1, and will cost $75,000. The dimensions of the building will be 500 ft. long and 115 ft. wide, covering six tracks.

The passenger depot of the Missouri, Kansas & Texas at Sedalia, Mo., was recently damaged by fire to the extent of about $7,500.

Boiler Explosion at the Passaic Rolling Mills.

A violent explosion occurred at half past 4 o'clock on the morning of Wednesday, May 4, in the boiler house of the Passaic Rolling Mill Co., at Paterson, N. J. Six of the 15-flue boilers were destroyed. The furnaces were fed with pea coal, and it is believed that the explosion was caused by gas. These boilers furnished power for the bridge shop, for the universal mill and for the puddle mill, and it will probably be a week before the wreck can be cleared and repairs be made sufficiently to start those mills again in operation. The company is fully insured by the United States Casualty Co. One man was killed by the explosion.

Railroad Material for Russia.

Under date of April 7 the Managing Director of the Eastern Chinese Railway Co., St. Petersburg, wrote to our Ambassador to Russia saying that "our company has resolved to order from the Pennsylvania Steel Co., and the Maryland Steel Co., 2,000,000 poods of rails and 240,000 poods of fish plates." Converted into long tons this would be 32,160 tons of rails and 3,870 tons of fish plates.

The Ambassador, writing from St. Petersburg

under date of April 7 sends the following telegram, just received from Mr. Dixon, Chief Engineer of the Sormovo Works: "First Russian standard locomotive built in Russia solely with American machinery and under American superintendence made its successful trial trip to-day."

Stone Bridges.

In the Journal of the Association of Engineering Societies for February is a paper entitled "History of the Stone Arch," by Prof. Malverd A. Howe, of the Rose Polytechnic Institute. It is an historical sketch, with many engravings from photographs of famous stone arches, going back, in fact, to a Babylonian brick arch supposed to have been built 4000 B. C. The paper is one which every collector of information of this kind will be glad to put away in his files, and in connection with it we again call attention to a lecture by Prof. George F. Swain, delivered before the Boston Society of Civil Engineers June 17, 1896, and published in the Journal of the Association in October of that year. This is entitled "The Historical Development of Stone Arches," and goes over much the same ground as that covered by Prof. Howe, but is more elaborated and contains pictures of many bridges not shown in the later paper.

In Prof. Howe's paper we find a photograph of an old stone bridge at Alcantara, Spain, built 105 A. D., also a picture of the bridge of Alcantara, at Toledo, Spain. The latter is also shown in Prof. Swain's paper. Doubtless many of our readers know that the name Alcantara is simply the Arabic for bridge, El Kantarah, El being the definite article. It is obvious that the Moors would have called the place where a bridge so important as one of these was built at that date "The Bridge," and that any other geographical name would be almost superfluous, and so the Moorish name has come down to us unchanged.

Axle Light on the Canadian Pacific.

The American Railway Electric Light Co. will equip the ten new sleeping cars that are now being built in the Montreal shops of the C. P. R. with its system of electric lighting. These will probably be the first cars lighted by electricity that will not be equipped with any auxiliary light—oil or gas. A few candle lamps will be carried in each car so as to be available in cases of emergency. Each car will be provided with storage sufficient for seven hours full burning or 14 hours half burning or 28 hours quarter, so that in the event of the car being detained unduly there will be sufficient power in the battery to light the car.

Contracts in Chicago.

Contracts for dredging and widening the Chicago River at the Diversey avenue bridge, according to the Government survey, was awarded April 29 by the Commissioner of Public Works to the Lydon & Drews Company for $47,063. The plans include the dredging of 278,000 cu. ft. of material and the erection of new docks along the river on both sides of the bridge.

At a meeting of the Board of Trustees of the Chicago Sanitary District, held in Chicago April 29, it was ordered that bids be asked for on the last important contract to be let by the Board for Drainage Canal Work. Section 18, through the City of Joliet, Ill., is the one now to be let, and bids will be opened in 60 days. Contract for section 17 was awarded to Heldmaier & Neu for $297,000. (April 29, p. 315.)

Contracts for conduits for the new intercepting sewer system of Chicago, noted in our recent issues, were let April 26 by Commissioner of Public Works McGann to the lowest bidders, as follows: For the Thirty-ninth street conduit, to the Chicago Star Construction Co., for $786,591; for the Lawrence avenue conduit, to Farley & Green, for $479,663. Both contractors must furnish bonds for 50 per cent. of the contract price. These conduits will be built by the tunneling process where the tearing up of streets would cause interference with car tracks or other damage. Work must begin within one month and be completed in one year.

New Railroad in Italy.

Information just received says that a new company has been formed in Naples, Italy, with a capital of $200,000, to be known as the Societa della Ferrovie del Vomero, for the purpose of building two short roads. It is expected that the company will be in the market for track materials and rolling stock about Aug. 1.—Journal of Commerce (New York).

Electric Contracts in Chicago.

Mayor Harrison and City Electrician Ellicott of Chicago have selected during the past month locations for 1900 new electric lights, 600 of which will be placed on the South Side, 250 on the North Side and 1,050 on the West Side. The cost of the 1,900 lights will be about $142,000, leaving $8,000 of the original appropriation of $150,000 unexpended. To this should be added $25,000 paid by the street railway companies for lights so placed as to benefit their traffic. This leaves $33,000 in the electrical department for further extensions. (April 8, p. 261.)

Copper Sheathing for Passenger Cars.

The Erie has a car in passenger service running between New York and Chicago sheathed with copper, under Mr. Appleyard's well-known system. Several others will be sheathed for experiment and the further application will depend upon the results obtained from this experiment.

THE SCRAP HEAP.

Notes.

The plant of the Carlisle Mfg. Co., Carlisle, Pa., has been sold to the Adams Railway Equipment Co. of Philadelphia.

The offices of the Scherzer Rolling Lift Bridge Co. have been moved from Unity Bldg. to 1616 Monadnock Block, Chicago.

The shops of the Union Pacific at Denver, Col., have been leased for a number of years to the Union Pacific, Denver & Gulf.

The Railroad Commissioners of Missouri have inspected the Cape Girardeau & Fort Smith Railway and find it in unsafe condition; the ties are very badly decayed, and many of the bridges are unfit for service. An order has been sent to the Receiver of the road requiring him to put it in condition for the safe transportation of passengers by Aug. 1.

A new building for the Railroad Young Men's Christian Association has lately been built at Two Harbors, Minn. It is 32 ft. x 60 ft. and cost $6,200. The money was furnished by the Duluth & Iron Range Railroad, the employees of the road and the citizens of Two Harbors.

A passenger train of the Southern Pacific was stopped by six masked robbers at Comstock, Tex., on the night of April 28, and the mail car and express car were wrecked by dynamite. The express company's safes and the mail bags were robbed, but the amount of valuables taken is not reported.

Frost & Granger, Architects, Chicago, are designing a new passenger station for the Union Pacific at Omaha, which will cost approximately $150,000. They are also making plans for a $15,000 passenger station at Green Bay, Wis., and an $8,000 station at Worthington, Minn., for the Chicago & Northwestern.

The Grain elevator of the Georgia Railroad at Augusta, Ga., was burned down on May 1. Estimated loss $200,000. The passenger station of the Missouri, Kansas & Texas at Sedalia, Mo., was destroyed by fire on the morning of April 24. The building was nearly new and cost about $35,000. The fire started in the kitchen.

The Chicago, Milwaukee & St. Paul has reduced the number of suburban trains on the Evanston branch, between Chicago and Evanston, the change taking effect May 1. One less train is now run on Sunday and four less on week days. The reason given for the change is that the expenses of this branch are greater than the traffic warrants, so that a reduction is necessary. It will be remembered that this is the branch line for which an ordinance was recently passed by the Chicago City Council, granting the right to use electricity, which ordinance was vetoed by the Mayor.

Employees' Uniforms on the Wabash.

General Superintendent H. L. Magee, of the Wabash Railroad, has issued revised regulations governing uniforms for employees, which are to take effect on May 15. Passenger conductors, dining-car conductors and train collectors wear a single-breasted cutaway sack coat with gilt buttons. Conductors wear on the left sleeve gilt service stripes, one for each five years of passenger service. Passenger brakemen, station baggagemen, train porters and parlor-car porters wear single-breasted square sack coats, fitting close at the neck, with turnover collar and nickel buttons. The station agents wear uniforms similar to those of conductors. All the foregoing suits are of blue Clay imported diagonal goods, and the coats have "Wabash" on the collars, each side the letters, matching the buttons, whether white or yellow.

Telegraph operators wear a regulation cap. Enginemen and firemen of passenger trains and train baggagemen must wear regulation caps and Lightner's "Mechanics' Favorite" overalls, jumper and coat. Freight conductors and freight brakemen wear no uniform, but must wear a regulation badge on the cap. Crossing watchmen wear a regulation helmet hat and "Mechanics' Favorite" overalls and jacket. Passenger trainmen, except enginemen and firemen, wear linen-covered caps in the summer, to be washed by the company as often as may be necessary. The circular says that "it is desirable that the uniform suits should be pressed and cleaned when necessary."

Storage Regulations at New York City Freight Houses.

Rules prescribing storage charges on freight in New York and Brooklyn have been issued by the Trunk Line Association. Freight on piers or in warehouses will be stored free four days after day of notice of arrival, and if not delivered will be sent to a public storehouse on the morning of the fifth day. When such freight is switched to storehouses the minimum charge for switching will be 2 cents per 100 lbs. Freight may, in case of necessity, be sent to a public storehouse after 24 hours. If freight has to be sent back to Jersey City it will be charged 5 cents per 100 lbs. per month, or if kept in cars, $1 per day per car; and in addition 3 cents per 100 lbs. for returning the property from New York or Brooklyn. Freight which the railroads are to deliver free by lighter will be held in warehouses at the railroad terminus (Jersey City) free for 20 days. If at the end of 20 days such freight is not taken the charge in railroad warehouses will be 3 cents per 100 lbs. for the first 30 days and 1½ cents for each succeeding 30 days. This includes handling in and out. For export freight the through bills of lading must provide for clearance from the seaboard within 60 days from date of shipment, and free storage will be given up to the expiration of that period. These regulations take effect May 16.

The History of the American Society of Civil Engineers.

The "Historical Sketch of the American Society of Civil Engineers," by Charles Warren Hunt, was printed to be sold only on subscription, the proceeds to be devoted exclusively to the fund for the New Society House. At the annual meeting, January 19, 1898, the following facts in regard to the subscription to this book were brought out: Two thousand copies were printed; 300 were bound in full morocco, of which 216 have been sold at $10 a copy, the resulting net profit being $943. Seventeen hundred copies, which have been paid for, are still on hand, and the Board of Direction was requested to consider the propriety of offering to the membership these copies bound in a less expensive style and at a reduced price, the net proceeds to be applied to the Building Fund.

In compliance with this request it has been decided to bind as many copies as are necessary to supply the demand in cloth and to sell them at $5 a copy.

There are a few copies still on hand of the first lot bound, for sale at $10 a copy.

New Chicago Great Western Limited.

About July 1 the Chicago Great Western will put on a new limited train between Chicago and Minneapolis. The Pullman Company is now building the new sleepers and buffet cars for these trains, and the Barney & Smith Car Co. is building the chair cars.

Massachusetts Institute of Technology.

Entrance examinations will be held at the Rogers Building, 491 Boylston street, Boston, Mass., on Thursday and Friday, June 30 and July 1. A second series, for those unable to be present at the first, will be held on September 20 and 21. The examinations will begin at 9 a. m., and attendance on both days of one series or the other will be required. For the convenience of applicants outside of New England entrance examinations will be held on June 30 and July 1 in 21 cities other than Boston. Candidates who intend to be examined in any other place than Boston are requested to send their names to the Secretary, Mr. H. W. Tyler, in time for him to receive them by June 15.

Railroad and Steamship Enterprises in Guatemala.

Consul-General Beaupre writes from Guatemala, April 2, 1898: "On the 23d ult. the National Assembly empowered President Cabrera to sell or lease the Northern Railroad of Guatemala, or to make such contracts as will insure its completion in the shortest time possible. This step is of great importance to the trade of the United States. This railroad is now completed from Puerto Barrios, on the Gulf of Honduras, to El Rancho, San Augustine, about 133 miles, and the surveyed line from that point to this capital is about 56 miles. While the construction will be difficult for this distance, it is entirely practical, and the road can be built in two years. The engineers have estimated the cost at about $2,500,000 gold.

"When completed the bulk of the exports and imports will be carried over this line. Puerto Barrios is about 800 miles from New Orleans, and the heavy sea freights which American goods have had to pay on the long voyage from San Francisco or via Panama will be much reduced. American merchants can travel comfortably and quickly to this market, and our trade will greatly increase. The value of this railroad as an investment is well understood by foreign capitalists, and I believe there is not the slightest doubt of its completion within three years. It would be well for Americans who desire to place money in foreign enterprises to investigate this railroad. A valuable concession can be had, and the completed road purchased for less than half its original cost.

"The Pacific Steam Navigation Company, an English corporation, and the Chilean Compania Sud America de Vapores have for some time been jointly endeavoring to increase their Pacific coast trade, and the National Assembly on March 26 authorized the President of this Republic to enter into a contract with these steamship lines to carry the mails between the ports of Valparaiso, Chile, and Ocos, Guatemala, giving them a subsidy of $15,000 per year, that sum to be increased to $30,000 per year when the steamers shall run to San Francisco. Boats must stop at least once a week at Guatemalan ports, and the tariff of transportation is to be fixed before the signing of the contract. This will interfere with the interests of the Pacific Mail Steamship Company, an American enterprise, which has long controlled the Pacific coast trade."

Projected Harbor Works of Montevideo.

Consul Swaim, of Montevideo, under date of Feb. 24, says: "Plans are being made for improvements of this harbor. As soon as the elections are held the work will be undertaken by contract. Plans have been prepared, but they will all be examined again and submitted to the judgment of skilled engineers, among others, those from the United States. The work will cost from $7,000,000 to $15,000,000."

New York Electrical Exhibition.

The Electrical Exhibition of the New York Electrical Society was opened Monday, May 2, at Madison Square Garden. Mr. Chauncey M. Depew presided. A message was read from President McKinley, received by telegraph at the speakers' stand. The message, together with one received by telephone from Vice-President Hobart, was set in type by a Mergenthaler Linotype machine run by electricity, and in 90 seconds from the time of the receipt of the messages they were being printed on a Thomson printing press run by a direct-connected electric motor. A large part of the machinery and exhibits were not ready for the opening.

Among the exhibits are the following: John Stephenson Co., Ltd., a model car, and a full-sized Madison avenue car, mounted on a section of track and showing the conduit electric system.

The Peckham Motor, Truck and Wheel Co. shows on this car the Metropolitan special high speed single truck. This company also shows models of a 14 B short-wheel-base swivel truck, a 14 D swing bolster maximum traction truck and a No. 7 B—X excelsior truck.

The Gold Car Heating Co. has exhibits of electric

heaters for street and elevated cars and standard railroad coaches.

The Walker Co., on the full-sized Madison avenue cars, shows motors, collecting device, controller and conduit system, besides showing in Section "G" a large exhibit.

The Consolidated Car Heating Co. shows heaters.

The New York Car Wheel Works show machined chilled charcoal iron wheels, mounted on special cold-rolled steel axles, sections of axles and sections of treads of tramway wheels showing chill.

The Niles Tool Works have a car wheel borer and an exhibit of other machine tools.

The Berlin Iron Bridge Co. shows anti-condensation fireproof covering.

The exhibit of the Cleveland Twist Drill Co., in Section "R," is very good.

Some other exhibits are those of the Samson Cordage Works, J. H. Williams & Co., drop forgings; American Engine Co., Belknap Motor Co., Babcox & Wilcox Co., De La Vergne Refrigerating Co., showing Hornsby-Akroyd oil engines; Forest City Electric Co., rail bonds and commutators; Garvin Machine Co., Stirling Supply and Manufacturing Co., fare registers; Henry R. Worthington, Inc.; the Translucent Fabric Co. shows its translucent material, a substitute for glass. Other exhibits were mentioned in the Railroad Gazette of April 29.

Need of Block Signals for Electric Railroads.

Mr. Moore, Mechanical Engineer of the Michigan Railroad Commission, has made a report on the protection of electric cars from butting collisions. Serious collisions have occurred in that State, calling attention to the necessity of some better provision for keeping cars apart, that is, for maintaining an adequate space interval between trains. Mr. Moore finds that the employment of train dispatchers and the management of trains by telegraphic orders repeated would be too cumbersome and costly for use on street roads. Telephones are finding favor on some roads, instruments being placed either at the side of the road, at meeting places, or in the motor cars, with wires to connect with the line at any point where it may be desirable to communicate with the Superintendent's office. Automatic electric block signals are mechanically feasible, but the cost is heavy. The staff system is commended, but the Engineer finds in the element of expense a great obstacle to all the methods considered, and his final recommendation goes no farther than to call upon the electric railroad companies of the state to file with the Railroad Commissioner a full description, with plans, of the method they use.

Mr. Moore has also investigated certain complaints that steam railroads run passenger trains with an insufficient number of brakemen. After extended inquiry he recommends that on passenger trains consisting of two cars a conductor and a baggageman shall be deemed sufficient, provided the baggageman makes the protection of the train his first duty, and provided he is at all times able to leave the car, when necessary to take part in switching work. On a passenger train of more than two cars and less than four passenger cars, a conductor, baggageman and one brakeman should be provided, and on longer trains an additional brakeman for each three passenger cars. Where the porter of a private car or of a parlor car owned by the road is charged with the duty of assisting in the train work, the number of brakemen might be one less.

The Fleets of the United States and Spain.

The Engineer (London) of April 15 contains an analysis of the war fleets of the United States and Spain. In aggregate displacement we are greatly superior, our total tons being 72,069, and the total displacement of the Spanish ships 58,903. In the number of guns mounted we are also superior, having 294, against 243 for the Spaniards. But here our apparent advantage ends. In metal thrown and fire-energy developed per minute the Spaniards have a great superiority, the weight of metal being respectively 37,808 lbs. and 40,811 lbs. The fire-energy in foot-tons per minute is 1,120,323 for the United States and 1,529,516 for Spain. In the immensely important item of average speed the Spanish fleet is also decidedly superior, the averages being 19.63 knots and 23.67. This analysis covers battleships, armored cruisers and protected vessels of recent type, and includes 16 Spanish vessels and nine belonging to the United States. It is assumed that these modern ships "will occupy the van of the fighting line." The average speed in the case of the United States is pulled down by the comparatively slow speed of the three battleships Indiana, Massachusetts and Iowa, the speed of which ranges from 15.5 to 16.2 knots. The greater fire-energy of the Spanish fleet is due to the 47 quick firing guns of 5.5 in. calibre. So far as these ships go it would seem that the Spaniards have a very important advantage. Speed, quickness in maneuvering and rapidity of fire are elements of the greatest importance. How far the apparent superiority of the Spaniards in these respects will be offset by the greater skill, courage and executive capacity of the men in the American ships remains to be seen by the test of battle. In the Manila fight our fleet was decidedly superior in guns, displacement, protection and speed.

LOCOMOTIVE BUILDING.

The Luckiamute Valley & Western will be in the market for locomotives about July 1. J. S. Talbot of Dallas, Ore., is President.

The Chihuahua & Pacific, referred to in our issue of April 8, has placed an order with the Brooks Locomotive Works for one American type passenger and four consolidation engines.

The Baldwin Locomotive Works are building one small engine for E. D. Smith & Co., contractors, one for the Arnold Mining Co. of Copper Falls, Mich., and one narrow gage engine for the Alaska-Mexican Gold Mining Co.

It is generally understood that the Cleveland, Cincinnati, Chicago & St. Louis intends ordering about 20 more consolidation engines like the sample built by the Richmond Locomotive & Machine Works and referred to in our issue of April 1.

CAR BUILDING.

The Luckiamute Valley & Western (see Locomotive Building column) will be ready to place orders for cars about July 1.

The Newton (Mass.) Street Railway Co. has placed an order with the Wason Car Mfg. Co. for six new open cars.

The Chicago Great Western is remodeling a number of chair cars at its own shops, all of which are to have wide vestibules.

It is reported that the Central of Georgia is building 200 combination fruit and box cars at its Savannah shops.

It is reported that the Grand Trunk will order 300 freight cars in this country, but we were unable to confirm same at time of going to press.

We are officially informed that the Illinois Central is receiving bids on 500 coal cars of 80,000 lbs. capacity, but has not definitely decided to order them.

In reference to the new gondola cars for the Orange Free State Railroad, mentioned in our issue of Feb. 4, it is now stated that the order called for 125 cars, to be built by the Jackson & Sharp Co. The Bloomsburg Car Co. built only the trucks and not the cars complete, as at first reported.

The Hetherington & Berner Co. of Indianapolis is building a number of portable asphalt paving cars. The Terre Haute Car & Mfg. Co. is furnishing its standard 80,000 lbs. capacity iron trucks and tower couplers, Westinghouse air brakes and National hollow brakebeams for these cars.

The two buffet cars ordered by the Chicago Great Western from the Pullman Co. are to be delivered in June, and will be used on the new limited trains of that road mentioned elsewhere in this issue. These cars are to be 63 ft. long and equipped with Kewanee brake beams, Westinghouse air brakes, Tower couplers, Pullman wide vestibules, Consolidated Car Heating Co.'s heating system, Pintsch gas, Standard steel platforms and 36 in. Standard steel-tired wheels.

In reference to the reports that the Allegheny Valley is building a number of new gondola cars at its Verona shops, we are officially informed that the road is simply replacing at these shops all cars which are torn up or destroyed, and, when necessary, is changing the forms to comply with the standards of the road, which call for gondola cars 33 ft. long, 8 ft. 4 in. wide, with sides 40 in. high, and box cars 34 ft. long, 8 ft. 4 in. wide and 7 ft. 2 in. high. All equipment of the road has automatic couplers and all new cars are being equipped with air brakes.

BRIDGE BUILDING.

ANGOLA, N. Y.—Press reports state that a contract will shortly be placed by the Western New York & Pennsylvania and the New York, Chicago & St. Louis for a steel viaduct at Angola, to be 683 ft. by 50 ft.

BALTIMORE, MD.—It is stated that the Cumberland & Pennsylvania will build two steel bridges, one over Willis Creek and one at Wingert's.

BOSTON, MASS.—Sealed bids for building a draw span and two spans of steel superstructure for Charlestown bridge will be received by the Boston Transit Commission at its office, 20 Beacon St., until 12 o'clock m., Thursday, May 12, 1898. George G. Crocker, Chairman Boston Transit Commission. B. Leighton Beal, Secretary.

BUFFALO, N. Y.—Sealed proposals for work and material will be received at the office of the Engineer of the Grade Crossing Commission, Mr. Edward B. Guthrie, 436 Ellicott Square Building, until 11 o'clock a. m., May 10, for construction and erection of the superstructure for a viaduct over the Lake Shore & Michigan Southern; Erie; New York Central & Hudson River; West Shore, and the Western New York & Pennsylvania tracks at the Hamburg street crossing, and the Western New York & Pennsylvania; West Shore, and the New York Central & Hudson River tracks at the Seneca street crossing.

CANASTOTA, N. Y.—The Governor signed Assemblyman Fish's bill appropriating $18,000 for a bridge over the Erie Canal at Peterboro St.

CHEHALIS, WASH.—The Commissioners of Lewis County will build an iron bridge 100 ft. long across the south fork of Newaukum River.

ELLENDALE, N. D.—Bids are asked by the Commissioners of Sussex County for building a steel bridge across James River, to be 175 ft. long by 16 ft. wide.

JACKSON, MISS.—A new bridge will be built on Capitol St.

MARION, IOWA.—The Commissioners of Linn County have voted to issue $20,000 in bonds for building a bridge across Muskegon Lake.

NEW YORK, N. Y.—A hearing on the proposal to build a bridge across Jamaica Bay took place Jan. 28 before Major Henry M. Adams, of the Corps of Engineers, in the Army Building. The bridge company was represented by Tracy, Boardman & Platt, 35 Wall St. The proposal is to connect Old Mill Creek and Rockaway Beach west of the Long Island Railroad bridge and east of the Kings County line.

NIAGARA FALLS, N. Y.—The Commissioners of the State Reservation at Niagara met recently at 214 Broadway, New York City, and directed that a new stone-arched bridge be built from Goat Island to the First Sister Island, in accordance with plans already approved at a cost of $15,000. The commission also approved the plans for the building of bridges from Goat Island to the mainland, but the construction was deferred until such time as the Legislature provides the money. Andrew H. Green, President.

ROME, N. Y.—The Governor signed Assemblyman Mason's bill appropriating $8,000 for an iron bridge over the Erie Canal at South George St.

SHELBURNE FALLS, MASS.—The Shelburne Falls & Colrain Street Railway Co. will build a bridge across Deerfield River.

ST. JOSEPH, MO.—Press reports state that the County Court (Buchanan County) has authorized the building of seven bridges, estimated cost $8,000.

WATERFORD, N. Y.—The Governor signed Mr. Kavanaugh's bill appropriating $1,000 for an iron foot bridge over the Champlain Canal at Sixth St. Total cost of the bridge will be about $3,000.

WATERVILLE, ME.—The Waterville & Wiscasset will build a bridge over the Kennebec River. (See Railroad Construction column.)

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Pennsylvania.—Semi-annual, 2½ per cent., payable May 31.
Manchester & Lawrence.—Semi-annual, 5 per cent., payable May 2.
Great Northern.—Preferred, quarterly, 1½ per cent., payable May 2.
Kansas City, St. Louis & Chicago.—Preferred, guaranteed, quarterly, 1½ per cent., payable May 2.
St. Paul, Minn. & Man.—Guaranteed, quarterly, 1½ per cent., payable May 1.
North & West Branch (Pa.).—Four per cent., payable May 2.
Sunbury, Hazleton & Wilkesbarre (Pa.).—5 per cent., payable May 2.

Albany Ry.—Quarterly, 1½ per cent., payable May 1.
Duquesne Traction (Pittsburgh).—1 per cent., payable May 2.
Glens Falls (N. Y.), Sandy Hill & Fort Edwards.—Quarterly, 1¼ per cent., payable May 1.
Pittsburgh Traction.—2 per cent., payable May 2.
Dartmouth & Westport (Mass.).—Quarterly, 2 per cent., payable May 1.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

American Society of Civil Engineers.—Meets at the house of the society, 220 West Fifty-seventh street, New York, on the first and third Wednesdays in each month at 8 p. m.
Association of Engineers of Virginia.—Holds its formal meetings on the third Wednesday of each month from September to May, inclusive, at 710 Terry Building, Roanoke, at 5 p. m.
Boston Society of Civil Engineers.—Meets at 715 Tremont Temple, Boston, on the third Wednesday in each month at 7.30 p. m.
Canadian Society of Civil Engineers.—Meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday at 8 p. m.
Central Railway Club.—Meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.
Chicago Electrical Association.—Meets at Room 7,137, Monadnock Building, Chicago, on the first and third Fridays of each month at 8 p. m. J. R. Cravath, secretary.
Civil Engineers' Club of Cleveland.—Meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.
Civil Engineers' Society of St. Paul.—Meets on the first Monday of each month except June, July, August and September.
Denver Society of Civil Engineers.—Meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.
Engineers' Club of Cincinnati.—Meets at the rooms of the Literary Club, 25 East Eighth street, on the third Thursday of each month, excepting July and August, at 7.30 p. m.
Engineers' Club of Columbus (O.).—Meets at 12½ North High street on the first and third Saturdays from September to June.
Engineers' Club of Minneapolis.—Meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.
Engineers' Club of Philadelphia.—Meets at the house of the club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month at 8 p. m., except during July and August.
Engineers' Club of St. Louis.—Meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.
Engineers' Society of Western New York.—Holds regular meetings on the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.
Engineers' Society of Western Pennsylvania.—Meets at 410 Penn avenue, Pittsburg, Pa., on the third Tuesday in each month at 7.30 p. m.
Locomotive Foreman's Club.—Meets every second Tuesday in the clubroom of the Correspondence School of Locomotive Engineers and Firemen, 335 Dearborn street, Chicago.
Master Car Builders' Association.—Saratoga Springs, N. Y., Wednesday, June 15.
Master Mechanics' Association.—Saratoga Springs, N. Y., Monday, June 20.
Montana Society of Civil Engineers.—Meets at Helena, Mont., on the third Saturday in each month at 7.30 p. m.
New England Railroad Club.—Meets at Pierce Hall, Copley Square, Boston, Mass., on the second Tuesday of each month.
New York Railroad Club.—Meets at 12 West Thirty-first street, New York City, on the third Thursday in each month at 8 p. m.
Northwest Railway Club.—Meets on the first Tuesday after the second Monday in each month at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.
Northwestern Track and Bridge Association.—Meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.
Railway Club Secretaries.—Congress Hall, Saratoga, N. Y., June 8, 11 o'clock a. m. H. H. Roberts (St. Louis Railway Club), Secretary.
St. Louis Railway Club.—Holds its regular meeting on the second Friday of each month at 3 p. m.
Southern and Southwestern Railway Club.—Meets at the Kimball House, Atlanta, Ga., on the second Thursday in January, April, August and November.
Technical Society of the Pacific Coast.—Meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month at 8 p. m.
Western Foundrymen's Association.—Meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is secretary.
Western Railway Club.—Meets in Chicago on the Third Tuesday of each month at 2 p. m.
Western Society of Engineers.—Meets in its rooms on the first Wednesday of each month at 8 p. m., to hear reports and for the reading and discussion of papers. The headquarters of the society are at 1736-1739 Monadnock Block, Chicago.

The Engineers' Club of Philadelphia.

A regular meeting of the Club will be held on Saturday, May 7, 1898, at 8 o'clock p. m. The paper will be "A Case of Jurisprudence in Land Surveying," by A. E. Lehman. Mr. John Birkinbine will exhibit slides from flashlight photographs, illustrating systems of mine timbering.

The last conversational meeting prior to the summer recess will be held on May 14. An interesting programme has been arranged.

At the meeting of April 16, Mr. J. W. Ledoux presented the first paper of the evening, upon "The Deep Well Pumping Plant at Waukesha, Wis." He described the details of the water works plant at Waukesha as he found them in an examination made in February, 1897. The pumping plant supplied an average of 723,000 gallons per day from three artesian wells located at the corners of a triangle having sides 50, 70 and 90 ft., the depth of two wells being 1,000 ft., and the third 1,500, all being furnished with 6 in. drop pipes to a depth of 300 ft. At about the center of the space occupied by these wells was a cylindrical brick-lined reservoir 25 ft. deep and about 27 ft. clear diameter. The pumping station is located about 30 ft. to the north of the reservoir and contains the boilers, engines, pumps and air compressors, which were tested. Details of the sizes of machinery and the results of tests made by him and later by Mr. J. E. Gibson were given by Mr. Ledoux. Up to the time of his examination the average coal consumption had been about 12,000 pounds every 24 hours. To reduce the expenses of the station it was finally decided to sink two artesian wells located 10 ft. apart and install two deep-well pumps manufactured under patents of E. E. Johnson and giving guaranteed efficiency that was unusually high. By having extra wells an almost complete duplication of the well plant was secured. While the question of cost of the improvements was not touched upon, the statement was made that aside from the reduction of operating expenses the expenditure would almost have been warranted on account of the advantage of duplication.

Mr. Wilfred Lewis, after explaining the difficulties of measuring the inertia of moving machinery by older methods, exhibited and described an instrument which he had devised for this purpose, which consists essentially of a curved tube filled with water except for a small bubble of air which moves back and forward in the tube with its acceleration and retardation caused by the inertia of the body which carries the instrument. By means of a graduated scale placed beside the tube the inertia can be measured.

Western Society of Engineers.

The Entertainment Committee of the Western Society of Engineers for the present year will consist of Messrs. A. W. Fiers, Chairman; J. F. Lewis, C. F. Foster, H. W. Elmer and W. J. Karner.

Engineers' Club of Cincinnati.

At the April meeting of the club there was an attendance of 20 members. Mr. A. C. Elzner entertained the meeting with a budget of short papers in reply to questions on the following subjects: "Amount of Compressibility of Soils," by G. Bouscaron; "Timber Cribbing on Pile Foundations," reply by B. L. Baldwin; "Impurities in Water to Be Used for Cement Mortar," reply by Mr. W. B. Ruggles; "Drainage Vaults for Dwelling Houses in Suburbs," reply by Mr. Thomas B. Punshon. Discussion of the topics presented followed.

The committee appointed to prepare a memoir of Mr. Thomas B. Lovett submitted their report, which was accepted and ordered spread on the minutes of the club.

The matter of affiliation with the Association of Engineering Societies was reported on by the special committee, but action thereon was deferred until a later meeting.

Engineers' Society of Western New York.

At the regular meeting held Monday evening, May 2, at the Library Building, Buffalo, Mr. George W. Rafter, of Rochester, member of the society, addressed the members on the subject, "Run-off of Niagara River."

Independent Order of Railway Conductors.

This association held its eighth annual meeting at New Haven, Conn., April 26. The old officers were re-elected: F. A. Hermance, President; Thomas H. Cook, Vice-President, and E. B. Kenyon, New Haven, Secretary.

The Civil Engineers' Club of Cleveland.

At the meeting of April 26 Capt. Lewis J. Germain addressed the club on the subject of the Des Moines River Improvement, upon which he was engaged in 1856-8. He described the works and their method of construction in detail, and gave accounts of the ingenious manner in which he had overcome various difficulties. He maintained that it is the office of the real engineer to exercise his own genius in contending with emergencies, as well as to follow precedents in the routine of business. By way of illustration he gave instances from his own experience. He had saved a contractor from loss by showing him how to take out pipe clay at 18 cents a yard by the use of a special plough drawn by a cable and capstan. He had extemporized a means of ferrying Gen. Lyon's forces over the Osage River in 1861, much to the surprise of the rebels who had destroyed the old ferry. Other instances were cited. The Captain's remarks were listened to with attention and his descriptions were very amusing. A short discussion followed, and he answered a number of questions. On motion of Mr. Baker a vote of thanks was given to Capt. Germain, after which the club adjourned.

St. Louis Railway Club.

The annual meeting of the St. Louis Railway Club was held April 8 at the Southern Hotel, St. Louis. The Secretary's report was read, which showed that at the time of the annual meeting, one year since, the membership of the club was 758, during the year 37 resigned, 23 were dropped from the rolls for various reasons, and 5 died. The membership was increased during the year by 184, so that at the present time the club has a membership of 857, or a gain for the year of 119. The financial statement showed a balance in the treasury of $1,853.62 with all bills paid, being more than double the balance reported at the previous annual meeting.

The president, Mr. W. G. Besler, in his report commented upon the work which the club has done during the past year, and, in speaking of the factors which were rapidly improving railroad practice, spoke highly of the work of the American Railway Association and the different railroad clubs.

The election of officers for the ensuing year was as follows: President, Mr. C. B. Adams; Vice-President, Mr. J. J. Baulch; Second Vice-President, Mr. H. C. Barnard; Third Vice-President, Mr. J. R. Groves; Treasurer, Mr. S. G. Scarritt; Secretary, Mr. H. H. Roberts; Executive Committee, Messrs. J. B. Johnson, J. W. Stokes, A. G. Steinbrenner, W. A. Garrett, G. R. Leighton, E. S. Marshall and F. A. Johann.

Mr. Charles Waughop, Chief Joint Car Inspector, St. Louis, presented a paper entitled "Car Inspection—Past, Present and Future." On account of Mr. Waughop's absence the paper was delivered by a graphaphone. The April Proceedings contain a list of the names of all the members of the club.

New England Railroad Club.

The regular meeting of the club will be held at Pierce Hall, Copley square, Boston, Tuesday, May 10, at 8 p. m. The subject for discussion will be "Bituminous Coal and Coal Mining, or a Trip Through a Coal Field," with paper by Mr. George M. Carpenter.

The Northwest Railway Club.

The March meeting of the club was held at the West Hotel, Minneapolis, Tuesday, March 15, President Lyon in the chair. Discussion was had on the M. C. B. rules.

Central Railway Club.

The committee on entertainment, consisting of Messrs. E. Chamberlin, Chairman, F. B. Griffith and O. P. Letchworth, has arranged for a carriage ride and visit to the establishment of the Pratt & Letchworth Company. The party will leave the Hotel Iroquois promptly at 10 a. m. for a drive over the parkway, stopping at the Front for a short visit at Fort Porter. Arriving at the Pratt & Letchworth Company's establishment at 11 a. m., a tour of the works will be made, after which lunch will be served to the visitors as the guests of the company, and they will then return to the hotel about 1 o'clock, arriving here in time for the business session of the club at 2 o'clock. The programme for the business session was given in these columns April 22.

PERSONAL.

—Mr. John Bogart, M. Am. Soc. C. E., was appointed, Saturday April 30, on the staff of Governor Black of New York, as Lieutenant-Colonel of Engineers.

—Mr. Charles B. Royal, Master Mechanic of the Seaboard Air Line, Portsmouth, Va., was married April 20 at Topeka, Kan., to the daughter of Mr. John Player, Superintendent of Machinery of the Atchison, Topeka & Santa Fe.

—Mr. John De Koven, a Director of the Chicago, Rock Island & Pacific and also of the Lake Shore & Michigan Southern, died of heart failure in Chicago, Ill., April 30, at the age of 65. He was also a Director of the Merchants' Loan & Trust Co., of Chicago.

—Mr. Frederick Arthur Wested, Superintendent of the Middle Division of the Baltimore & Ohio, with offices at Cumberland, Md., was married in Baltimore April 26, to Miss Fanny Belle Sommerville of Lonaconing, Md., daughter of Mr. R. L. Sommerville, Superintendent of the George's Creek Coal & Iron Co.

—Mr. Virgil G. Bogue, M. Am. Soc. C. E., has recently returned to New York from the Pacific Coast, where he has been for some months making important investigations of the properties of the Southern Pacific Company. His New York office is now at 66 Manhattan Life Building, and his Chicago office has been closed.

—Mr. William Barclay Parsons, M. Am. Soc. C. E., Chief Engineer of the Rapid Transit Commission of New York City, 22 William street, New York City, was appointed on Saturday, April 30, Chief of Engineers on the staff of Governor Black of New York, with the rank of Brigadier-General.

—Mr. Joseph T. Hayden, late Traveling Auditor of the Lake Shore & Michigan Southern, with office at Cleveland, O., died at Auburn, Ind., April 24, after a long continued illness. Mr. Hayden was born at Northampton, Mass., Nov. 24, 1826, and entered railroad service in 1860 with the Michigan Southern & Northern Indiana, which in 1869 became a part of the Lake Shore & Michigan Southern. He was appointed Traveling Auditor of the L. S. & M. S. in May, 1873, and resigned Feb. 1, 1896, on account of ill health.

—Messrs. Louis Duncan and Cary T. Hutchinson have formed a partnership under the name of Duncan & Hutchinson. They will undertake a consulting electrical engineering business, with offices in the Empire Building, 71 Broadway. It will be remembered that in the early days (less than 10 years ago), when electrical engineering sprang suddenly into light as one of the most brilliant and promising branches of the profession, Messrs. Sprague, Duncan and Hutchinson made a partnership something like that which is now formed between the two junior members of the old firm. While that original partnership did not last long, the partners have been in close relation ever since and have had a strong influence in the development of the electrical art, and stand to-day among the best known specialists.

—We suppose that hereafter Mr. George R. Blanchard, already famous, must be known as Gen. Blanchard, for he has been selected by the Secretary of War to take charge of that part of the business of the War Department which covers the movement of troops and military supplies by rail, and it is conjectured that he will be made a brigadier-general. When it was announced in the newspapers two or three weeks ago that Mr. Frank Thomson was chosen for this place we declined to notice the rumor in the columns of the Railroad Gazette, because it was absurd on its face. On the other hand, the appointment of Mr. Blanchard is obviously probable. He is undoubtedly thoroughly fit for the duties of the position; he can be better spared from his present duties than any man in active charge of an important railroad, and he would fill the uniform of a brigadier general with uncommon grace and dignity.

—Mr. Cornelius Sheehy, until recently District Passenger Agent of the Canadian Pacific at Detroit, Mich., died at his residence in that city, April 26, at 71 years of age. Mr. Sheehy was born in Ireland in 1837, and entered the service of the Northern Railway of Canada, which is now a part of the Grand Trunk, in 1854. For about two years from 1855 he served as Baggage Master and Freight and Passenger Conductor of the same road. Mr. Sheehy was with the Michigan Southern & Northern Indiana, now a part of the Lake Shore and Michigan Southern, as Traveling Passenger Agent from 1864 to 1867, when he was appointed Eastern Canadian Passenger Agent of the Michigan Central. He held that position for nine years. In 1877 he became Canadian Passenger Agent of the Wabash, St. Louis & Pacific (now Wabash), and in 1890 was appointed District Passenger Agent of the Canadian Pacific. He retired from active service May 1, 1897.

—For a couple of weeks the story has been flying around the newspapers that Mr. Frank Thomson, President of the Pennsylvania Railroad, has been appointed to some office under the Secretary of War and that he is to have charge of the transportation of troops and stores and of military railroads. We have never permited this to get into the Railroad Gazette, because it would be perfectly obvious to anybody who reflected upon the matter and who is qualified to judge that, first, we have no military railroads and are not likely to have; and second, Mr. Thomson could not afford to take any such position, except as a matter of duty to his country, the necessity for which has not yet arisen; and third, there are a great many men in the country occupying less responsible positions who are well qualified to conduct such a bureau should one be organized in the War Department. Nothing would be more natural than that Mr. Thomson should be consulted by the Secretary of War as to the movement of troops and supplies, and we supposed that such consultation had given rise to the story that has gone the rounds. Inasmuch as it has finally got into the columns of two or three papers that ought to know better, we have taken the pains to ask for the facts. We are now informed officially "that there is nothing in the published account that Mr. Thomson has been selected as Aide to the Secretary of War in charge of military transportation. The statement probably originated in the fact that Mr. Thomson has been in frequent consultation with the administration officers at Washington."

—Capt. Eugene Griffin, Vice-President of the General Electric Co. (formerly of the United States Army) and Mr. William Barclay Parsons, Chief Engineer of the Rapid Transit Commission, New York, in letters written by each without knowledge of the other's intention, tendered their services to the Government, to raise a volunteer regiment of Engineers. Captain Griffin some time ago sent a request to the employees of his company asking them to join a volunteer corps of electricians and to offer their services to the Government in the war with Spain. He communicated with other companies, and in less than a week he had 1,000 men enrolled. The addresses of these men were sent to the office of the Chief of Engineers, U. S. A. Capt. Griffin's original plan was to raise a brigade, and special legislation designed to carry that proposition into effect is now pending in Congress, the Secretary of War being unable to apportion more than 750 men to the special service suggested; but the Secretary of War has authorized the enlistment of a volunteer regiment to consist of 14 companies, 10 of which are to be raised in New York City, and two each in Boston and Baltimore. If Congress shall permit the enlargement of the force to a brigade, two additional regiments will be recruited in other parts of the country. The regiment will probably be used largely for coast defence and harbor work. It is the intention to have it representative of all branches of the profession, and it is to embrace civil, mechanical and electrical engineers, practical electricians, mechanics, artisans, draughtsmen and men familiar with all kinds of engineering work, all capable of being rapidly converted into military engineers with proper training. Capt. Griffin is a graduate of West Point of the class of 1875, and has served 14 years in the army, resigning with the rank of Captain in 1892 to take charge of the Railway Department of the Thompson-Houston Electric Co., which was subsequently merged with the General Electric Co.

ELECTIONS AND APPOINTMENTS.

Atlantic City (P. & R.).—At the annual meeting held in Philadelphia, May 3, Frank B. Stitley and L. H. Parkhurst were elected Directors.

Baltimore & Ohio.—James N. Fuller has been appointed Commercial Agent, with office in Wall St., New York City. William Goodnow, Traveling Auditor of the Staten Island Rapid Transit Railroad, has resigned.

Boston & Albany.—Henry B. Chapin, heretofore General Freight Agent, with office in Boston, has been appointed General Traffic Manager, succeeding Arthur Mills, resigned (April 22, p. 299), and Hamilton Perkins, heretofore Assistant General Freight Agent, succeeds Mr. Chapin as General Freight Agent. Henry C. Blood has been appointed Assistant General Freight Agent, succeeding Mr. Perkins.

Breckenridge, Dillon & Northern.—The officers of this company are: President, J. P. Looney; Vice-President, R. W. Foote; Secretary, W. H. Frye; Treasurer, W. M. Clark; Manager, D. W. Fall, all of Breckenridge, Col. (April 1, p. 245.)

Camden County (P. & R.).—At the annual meeting held in Philadelphia, May 3, Frank B. Stitley was elected Director, succeeding M. D. Sarfaty.

Canadian Government Railways.—G. R. Joughins, heretofore Superintendent of Motive Power of the Norfolk & Southern, with headquarters at Berkeley, Va., has been appointed Mechanical Superintendent of the Canadian Government Railways. The appointment took effect May 1.

Canadian Pacific.—H. B. Spencer has been appointed Superintendent of the Eastern Division, with headquarters at Ottawa, Ont., succeeding J. E. A. Robillard, transferred. David R. Bell, heretofore Trainmaster at Toronto Junction, has been appointed Superintendent of terminals at Montreal, succeeding W. J. Singleton, promoted.

Cincinnati Northern.—C. W. Cook, General Freight and Passenger Agent, with office at Van Wert, O., has resigned to engage in other business.

Central Pacific (S. P.)—At the recent annual meeting, held in San Francisco, Cal., Irving M. Scott was elected a Director, succeeding the late Judge F. E. Spencer.

Chesapeake & Ohio.—W. H. Whittlesley has been appointed Joint Passenger Agent of the C. & O. and the Cleveland, Cincinnati, Chicago & St. Louis in Texas, with headquarters at Dallas. The appointment took effect May 1.

Chicago, Rock Island & Pacific.—Charles B. Sloat, heretofore Assistant General Passenger and Ticket Agent of the Chicago, Rock Island & Texas, has been appointed General Passenger Agent, relieving J. C. McCabe, General Freight, Passenger and Ticket Agent, of the C. R. I. & T., of part of his duties. Mr. McCabe's title is now General Freight Agent. The headquarters of both remain at Fort Worth, Tex. W. C. Staley, Commercial Agent of the C., R. I. & P., at St. Joseph, Mo., has been appointed General Freight Agent at Kansas City, Mo.

Elkhart & Western.—A. D. McKnight has been appointed Traffic Manager, succeeding D. F. Coe, resigned. (April 29, p. 316.)

Fairchild & Northeastern.—John T. Fatzinger has been appointed Traffic Manager and Auditor, with headquarters at the general office in Fairchild, Wis.

Illinois Central.—John A. Scott, heretofore Division Passenger Agent at Memphis, Tenn., has had his jurisdiction extended to cover that portion of the line between Memphis and Cairo, Ill. His headquarters remain at Memphis.

International & Great Northern.—W. B. Teagarden, of Mineola, Tex., has been appointed to the charge of the Legal Department of the I. & G. N. in Paris and Galveston Counties, succeeding Jones & Garnett, of Houston, and Davidson & Minot, of Galveston, Tex.

Lehigh Valley.—General Traffic Manager Henry H. Kingston and General Passenger Agent Charles S. Lee have removed their offices from South Bethlehem, Pa., to the Havemeyer Building, New York City. The Auditing Department of the Coal Co., which has been located in South Bethlehem, is to be transferred to Philadelphia.

Minneapolis & St. Louis.—A. H. Mings has resigned as General Storekeeper, with headquarters at Minneapolis, Minn., and has been succeeded by Fred Wing.

New York Central & Hudson River.—The first changes announced by the new President are: H. J. Hayden, Second Vice-President, in charge of the Traffic Department, will continue to represent the N. Y. C. & H. R. and its allied lines on the Board of Managers of the Joint Traffic Asscoiation, of which he is Chairman. H. Walter Webb having resigned (April 1, p. 244), the office of Third Vice-President has been abolished. General Manager John M. Toucey has been appointed to the newly created office of Assistant to the President, and the office of General Manager has been discontinued. Nathan Gilford, General Freight and Traffic Manager, will have general supervision of all freight traffic, and George H. Daniels, General Passenger Agent, will have general supervision of all passenger traffic, reporting direct to the President instead of to H. J. Hayden, as heretofore. The General Superintendent, Chief Engineer, Superintendent of Motive Power & Rolling Stock and the Purchasing Agent, who formerly reported to the Third Vice-President, will hereafter report to the President direct.

Oregon Short Line.—Charles M. Dunlop has resigned as Foreman of the Machine Shops at Pocatello, Utah, and has taken service with the Rio Grande Western.

Penobscot Central.—In the reorganization of this company, referred to in the Construction column, Amos Gerald, General Manager and Director, and I. C. Libby, Treasurer and Director, have retired, and are succeeded by Ezra L. Stearns of Bangor, Me., as Director, and F. H. Small, Treasurer. President Beal assumes the office of General Manager. H. M. Heath of Augusta is made Clerk and Legal Adviser.

Philadelphia & Chester Valley (P. & R.).—C. E. Henderson was elected a Director at the annual meeting held in Philadelphia, May 3.

Philadelphia & Reading.—F. W. Fowkes has been appointed Western Freight Agent, with headquarters at Chicago, Ill.

Philadelphia & Reading Terminal (P. & R.).—At the annual meeting held in Philadelphia, May 3, Henry P. McKean was elected a Director, succeeding his father, the late Thomas McKean.

Philadelphia, Newton & New York (P. & R.).—At the annual meeting held in Philadelphia May 3, B. H. Ball was elected a Director, succeeding the late Thomas McKean. (March 25, p. 223.)

Port Reading (P. & R.).—At the annual meeting held in Philadelphia, May 3, Frank B. Stitley was elected a Director.

Rio Grande Western.—Charles M. Dunlop, heretofore Foreman of the Oregon Short Line Machine Shops at Pocatello, Utah, has been appointed Foreman of the R. G. W. shops at Helper, Utah.

Seaboard Air Line.—J. L. Martin has been appointed Commercial Agent of the S. A. L. and also the Seaboard Despatch Line, with headquarters in Pittsburgh, Pa., The appointment took effect May 1.

Seivern and Knoxville.—At a meeting of the stockholders of this company, referred to in the Construction column, successor to the Greenwood, Anderson & Western, held in Charleston, S. C., April 25, the following Board of Directors was elected: Richard A. Springs of New York, F. W. Wagener, George A. Wagener, J. E. Burke of Charleston, and Isaac W. Fowler of Aiken, S. C. At a meeting of the Directors held later the following officers were elected: President, R. A. Springs; Secretary and Treasurer, P. F. Sullivan, Charleston, S. C.; Chief Engineer, E. E. Rutledge, Batesburg, S. C.

Southern.—C. L. Ewing, heretofore Trainmaster at Asheville, N. C., has been appointed Superintendent of the Anniston Division, succeeding A. Gordon Jones, transferred. (April 29, p. 317.)

Wabash.—Robert J. Woods has been selected Private Secretary to Vice-President Joseph Ramsey, Jr.

Waterville & Wiscasset.—The officers and directors of this new company, given in the Construction column, are as follows: President, Frank Redington; Clerk, William T. Haines; Treasurer, George K. Boutelle; Chief Engineer, John H. Burleigh. The Directors are: Frank Redington, Nathaniel Meader, Frank Chase, R. L. Proctor, John H. Burleigh, Ira E. L. Getchell, W. C. Philbrook, H. D. Eaton, George L. Learned, C. E. Gray, W. B. Arnold, L. H. Soper, George K. Boutelle, P. S. Heald, A. R. Yates, C. W. Abbott and J. F. Hills, all of Waterville, Me.

West Virginia & Pittsburgh.—Senator Johnston N. Camden and Clarence Carey have been appointed Receivers. (See Railroad News Column.)

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

ARIZONA & SOUTHEASTERN.—Amended articles of incorporation were filed in Arizona April 23 for an extension from Deer Point, near Don Luis, south about 4 miles to the Mexican State line. (Jan. 21, p. 50.)

ARKANSAS SOUTHERN.—Locating surveys are being made on the first division of this road from Junction City, Ark., south via Ruston, La., to Colfax. It is stated that active building will begin about June 1. (Oct. 29, 1897, p. 774.)

BALTIMORE & OHIO.—Work has been begun in connecting up side tracks and laying additional tracks on a seven-mile stretch between Yoder, Pa., and Sand Patch, on the Pittsburgh Division, with a view to eventually completing the double track. No contracts have been let, the work being done by the company. (Official.)

BANGOR & PORTLAND.—A branch of 1½ miles is proposed in Northampton County, Pa., from Pen Argyle to slate quarries.

BRUTON & PINEORA.—This line has been completed into Stillmore, Ga., and it is reported that work is being continued beyond that point toward Savannah. All the necessary material is provided for about 25 miles. The line now runs from Bruton southeast 28 miles to Stillmore. (Jan. 14, p. 34.)

CANADIAN PACIFIC.—The Dominion Railway Committee has passed favorably on a bill to extend the Nakusp & Slocan line from Three Forks, B. C., east about 15 miles to White Water, thus paralleling the narrow gage Kelso & Slocum line. The Kelso Board of Trade has sent a protest to Ottawa against this grant on the ground of injury to the Kelso & Slocan road.

CHATTAHOOCHE VALLEY.—Surveys are reported in progress for an extension from River View, Ga., southwest about 20 miles to Opelika. The present line runs from West Point south 10 miles to River View.

CHICAGO & NORTHWESTERN.—According to report, this company has recently bought property at Oshkosh, Wis., bordering on Lake Winnebago. Many improvements are contemplated, including the building of a brick freight depot and freight yard.

CHICAGO, BURLINGTON & QUINCY.—The Grant City, Mo., business men are reported to have arranged for a survey for an extension of the Grant City branch of the C., B. & Q. south from that city about 18 miles to Albany, or to some other point on the main line of the C., B. & Q.

CHICAGO, DETROIT & TOLEDO.—This company was incorporated in Michigan, April 23, with a capital stock of $500,000 to build a line from Detroit south to Toledo, O. Among the stockholders are John C. Shaffer, George D. P. Robinson, T. S. Mordant, D. E. Town, Chicago; Charles W. O'Brien, Leopold Freund and Alex. E. Riepelle of Detroit.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—Reballasting has been completed on the Eastern Branch of the Peoria & Eastern Division, and work has been begun on the Western Division between Farmers City and Leroy in replacing about 40 miles of ballast which was washed away by recent high waters. Work has also been begun in relaying new steel on the Michigan Division 58.8 miles north from Goshen, Mich., to Benton Harbor.

DES MOINES, NORTHERN & WESTERN.—A force of men is reported at work on the Boone Division reballasting the 15 miles of track between Madrid and Boone, Ia.

ERIE.—Survey is reported in progress for a proposed change of route in Indiana to carry the main line of the Chicago & Erie north about 2 miles through North Manchester. This would involve a change of some 25 miles of the line between Bippus and Disko.

GREAT NORTHERN.—Freeman & Gray have secured a sub-contract from A. Guthrie & Co. of St. Paul, Minn., for the improvements in grades and bridges, etc., on the main line west of Minot, N. D. (April 22, p. 300.)

KANSAS CITY, PITTSBURGH & GULF.—The Ft. Smith Branch from Oak Lodge on the main line about 4 miles south of the Arkansas River in Indian Territory, thence northeast 16 miles to Ft. Smith, is to be finished this week, and train service to begin May 9.

LAKE MANITOBA RAILWAY & CANAL CO.—Premier Greenway announces a grant of $8,000 per mile for 80 miles for an extension of this line from a point called Sifton, Man., near the north end of the road, which ends at Lake Dauphin, thence north to the Saskatchewan River, about 50 miles beyond the north border of the Province of Manitoba. It is stated that 65 miles of this extension is to be built this year.

LONG ISLAND.—A double-end siding on the Central (formerly Stewart R. R.), 900 ft. long in the clear, near the western extremity of Camp Black, Hempstead Plains, L. I., and another passing siding of some length near the eastern extremity, with a spur siding leading from it with 400 ft. clear standing room, have been completed at the Hempstead crossing, between the Central R. R. and the branch from Minola to Hempstead for facilitating movements of trains transporting troops to the camp. A station is also being built with shelter shed opposite the middle of the camp.

LUCKIAMUTE VALLEY & WESTERN.—Four miles has been graded on this line from Falls City, Ore., to Salem, 23 miles. Timbers are on the ground for the bridges, and the company proposed to put 25 teams at work May 1. (Official.) J. S. Talbot of Dallas, Ore., is President. (Jan. 28, p. 70.)

MERCHANTS & MANUFACTURERS' RAILROAD CO.—This company is being organized in Detroit, Mich., with a capital stock of $2,000,000 to build a line in that city extending from Eighth street along the river front to Adair street, including tunnel under a portion of the way. The line would connect the Michigan Central, the Lake Shore & Michigan Southern, the Grand Trunk, Wabash, Canadian Pacific, Detroit, Grand Rapids & Western, Detroit & Lima Northern and the Flint, Pere & Marquette roads. Among those interested are George H. Barbour of the Michigan Stove Co.; Fred T. Moran, Peninsular Stove Co.; J. B. Howarth, Pingree & Smith, Dr. J. B. Book, Frank W. Eddy, Albert Pack, Edwin Armstrong, M. W. Beecher, James Inglis and Homer Warren, all of Detroit. Thomas S. Jerome is Counsel, and Louis Warfield of New York, Engineer in charge.

MOBILE & OHIO.—The entire line from Columbus, Miss., southeast 168 miles to Montgomery, Ala., is reported completed, and regular freight and passenger train schedule will be put on about June 1. (April 8, p. 266.)

MONTOUR.—A contract has been let, according to report, for an extension of 2 miles to reach coal mines. The Montour runs from Montour Junction, Pa., southwest 11 miles to Imperial.

NASHVILLE, CHATTANOOGA & ST. LOUIS.—Surveys are being made for a branch from the Western & Atlantic line to run from either Ringgold or Graysville, Ga., to Chickamauga Park.

NELSON & BEDLINGTON.—Surveys were to have been completed May 1 for this line from Bonner's Ferry, Idaho, a point on the Northern Pacific, north 52 miles along the Valley of the Kootenay River to Kootenay Lake, B. C. It has not been decided yet when the contracts are to be let. N. D. Miller, Nelson, B. C., is Chief Engineer. (Official.)

NEW ROADS.—A contract is reported to have been let for building 2¾ miles of railroad to connect the Arnold and the Copper Falls mines, near Houghton, Mich. It is expected the road will be completed within 90 days.

NORFOLK, VIRGINIA BEACH & SOUTHERN.—Rails are laid on the extension from Kempsville, Va., southeast 22 miles to Munden, a point on Currituck Sound. From the terminus a line of steamers will operate to the principal points on Albemarle and Pimlico Sounds. (March 18, p. 18.)

OTTAWA, MONTREAL & JAMES BAY.—The Dominion Railway Committee has accepted a bill to incorporate this road to run from La Belle, Que., the terminus of a branch of the Canadian Pacific from Montreal, northwest about 375 miles to Rupert's Bay, a branch of Hudson Bay.

PENNSYLVANIA.—The Mont Alto line of the Cumberland Valley is to be extended south ¾ of a mile into South Waynesboro, Pa.

PENOBSCOT CENTRAL.—This company has been reorganized and it is expected that building will begin by September. The Eastern Trust & Banking Co. has been made Trustee for $84,000 of stock and bonds, which amount will be held for the benefit of the stockholders until the road is completed, and will not be used except for improvements. The road as projected is to run from Bangor, Me., northeast about 25 miles to Charleston. The new officers are given under Elections and Appointments. (May 21, 1897, p. 363.)

PICKENS.—Track has been laid over the entire line from Pickens, S. C., east nine miles to Easley, and trains are in operation between those points, although the track has not yet been ballasted. Bridges and trestles are finished and only 10 men are now at work. (Official.) Julius E. Boggs of Pickens is President. (March 18, p. 208.)

QUEEN & CRESCENT.—The Cincinnati, New Orleans & Texas Pacific is replacing its 60-lb. rails with 75-lb. rails on 25 miles of road between Harriman Junction, Tenn., and Sunbright. This section is also being reballasted.

SEIVERN & KNOXVILLE.—This line from Seivern, S. C., to Batesburg, is nearly completed, and will be opened for business in about two weeks. It is successor to the Greenwood, Anderson & Western, which was finished from Seivern to Aleathea, nine miles, in 1896. The line is to be operated in close connection with the Carolina Midland, which extends from Seivern south to Allendale, 55 miles. The C. M. was leased in 1896 to the G., A. & W. The lease was surrendered after the appointment of the Receiver of the leasing road on Jan. 5, 1897. The officers are given in another column. (Feb. 25, p. 148.)

SOUTHERN.—Grading has been completed on the entire 27.4 miles of the North Carolina Midland extension from Mocksville, N. C., northeast to Mooresville, and track has been laid from Mooresville to Barber Junction, six miles. About 600 ft. of trestle has been finished, and 700 ft. more will be in 30 days. Two 45-ft. girders and 133 ft. deck steel truss will be delivered June 1. About 200 men are at work on track, masonry and trestles. The original contract went to T. B. Jones & Co. of Baltimore. (Official.) W. H. Wells, Cleveland, N. C., is Engineer in charge. (Dec. 31, 1897; p. 936.)

SOUTHERN PACIFIC.—All grading is completed on the extension of the St. Martinsville Branch in Louisiana from St. Martinsville northwest 23.3 miles through the Valley of Bayou Teche to Arnaudville. (April 15, p. 285.) Between 5 and 6 miles of track is laid. There will be no ballasting, as the road runs through a country the soil of which is a sandy loam, on which the track can be maintained very cheaply. The road runs through sugar plantations principally, and there will be some 4 miles of spurs and switches

at stations and at sugar factories. The only important intermediate station is Breaux Bridge, 13.3 miles from St. Martinsville. (Official.)

ST. LOUIS & CENTRAL ILLINOIS.—This company was incorporated in Illinois April 28 with a capital stock of $1,600,000 to build a line from Venice, near East St. Louis, northeast through the counties of Madison, Bond, Montgomery, Fayette and Shelby to Duvall, a point on the Chicago & Eastern Illinois. The incorporators and first Board of Directors are A. A. Barnes, Indianapolis, Ind.; William B. Dean, St. Louis, Mo.; E. D. Waddel, East St. Louis; J. S. P. Gordon and G. A. Wilson, Collinsville, Ill.

ST. LOUIS, PEORIA & NORTHERN.—Trains began running May 1 on this line just completed from Springfield, Ill., north 63 miles to Peoria. (Jan. 21, p. 51.)

UNION PACIFIC.—Official confirmation is received that Owen Bros. of Norfolk, Neb., have obtained a contract for widening the embankment between Grand Island and Lexington, Neb., a distance of 78 miles. Ballasting is now being done. About 300 men are employed on the work.

WABASH.—Three surveys have been made for the proposed connection from Toledo, O., west to Montpelier, near the Indiana State line. There is a difference of 12 miles in the three surveys, but by the longest the line will cost less to build. By that route the distance between Toledo and Chicago, Ill., will be less by 14 miles than that of the Lake Shore & Michigan Southern. It is stated that one of these surveys will be accepted this month and work be begun immediately following.

WATERVILLE & WISCASSET.—This company has been organized in Maine to build a line from Week's Mills, a point on the Wiscasset & Quebec, to run north about 15 miles via China, East and North Vasselboro, Winslow and across the Kennebec River to Waterville; from that point it is proposed to carry the road eventually northwest to Oakland, where connection will be made with the Somerset Railroad; thence to the line of the Franklin narrow gage system and to the Rangeley Lakes. Sooner or later, it is proposed to extend the line northwest to the Canadian Pacific. Surveys are begun, and the company hopes to build this Summer. The stock subscription list is being circulated and quite generally subscribed to. The engineers report that the work will not be difficult. There will be one bridge of some 300 to 400 yds. in length across the Kennebec River, and as the water is not deep, it is thought that this can be built at comparatively low cost. The war may delay building somewhat, but the company hopes to put the line through from Waterville to the Wiscasset & Quebec during the summer. The officers are given in another column. (Official.)

WEST VIRGINIA & PITTSBURGH.—Holders of 5 p. c. first mortgage gold bonds dated April 1, 1890, are notified that, in view of the failure of the B. & O. to pay interest due April 1, Brown, Shipley & Co. of London will exchange the same for negotiable securities bearing interest from that date. The time for deposit has been limited to June 1. Holders in the United States may deposit with Brown Bros., New York.

WINNIPEG & SOUTHEASTERN.—Premier Greenway has announced that a grant of $8,000 per mile will be made for 80 miles of this line from Winnipeg, Man., southeast to a point near Whitemouth Lake; thence it is proposed to carry the line across the narrows of the Lake of the Woods, or, if such a route is not feasible, for about 40 miles through the State of Minnesota and eventually to connect with the Ontario & Rainy River. This is understood to be a part of Premier Greenway's proposed connection between Winnipeg and Duluth, Minn.

Electric Railroad Construction.

BANGOR, ME.—The Penobscot Central Railroad Co., organized in 1897, for the purpose of building an electric railroad between Bangor and towns in western Penobscot County, has been reorganized. President Beal becomes General Manager and F. H. Small Treasurer, while Herbert M. Heath, of Augusta, has been chosen as clerk and counsel. The road is bonded to the extent of $250,000, and the capital stock is of the same amount. President Beal says that he expects to begin the work of building the road in three weeks, and to have it completed by Sept. 1. The road will extend to Charleston, 25 miles from Bangor. (Feb. 5, May 21, June 25, '97; pp. 104, 363, 469.)

BALTIMORE, MD.—Press reports state that the Baltimore City Passenger Railway Co., in its plans for changing the Red and White lines from cable to electricity, will enlarge the Baltimore St. and Eutaw St. power plants and that the Light St. and Central Railway power houses are to be abolished.

BUFFALO, N. Y.—The Buffalo & Lockport Railway Co., capitalized at $1,000,000, was incorporated May 3 to operate a street railroad from Buffalo to Lockport. The directors are Burt Van Horn, H. J. Pierce, R. L. Fryer and G. H. Dunbar of Buffalo, J. A. Merritt, S. Curt Lewis and F. M. Ashley of Lockport, F. A. Dudley and W. Cayl Ely of Niagara Falls.

DANIELSVILLE, CONN.—The stockholders of the People's Tramway Company elected the following Directors: Frederick A. Jacobs, O. W. Bowen, Danielson; A. B. Sprague, Plainfield; William P. Kelly, Dayville; Robert L. Warner, Boston; Van Wyck Rossiter, New York City. The following officers were elected: President, F. A. Jacobs; Secretary, R. L. Warner; Treasurer, Van Wyck Rossiter. It is the intention of the company to proceed as rapidly as practicable with the surveys. (April 15, p. 285.)

EMMITSBURG, MD.—The Emmitsburg Railroad Co. of Frederick County, Md., was incorporated with the following directors: James A. Elder, John P Branner, William A. Hines, William G. Blair, Vincent Sebold and James H. Muscan of Wilmington, Del. The capital stock is $50,000.

FREDERICK, MD.—The Frederick, Thurmont & Northern Railway Co. was recently incorporated to build an electric road from Frederick to Gettysburg.

JOLIET, ILL.—The Joliet Railway Co. will build five miles of new track this summer and also double track several of the old lines. Some new cars have been bought and the power house plant will be repaired. (April 8, p. 266.; April 29, p. 318.)

LOS ANGELES, CAL.—The Los Angeles Traction Co., at present only operating local electric lines in Los Angeles, are now making their arrangements for a long suburban extension to the town of San Pedro, the port and harbor of Los Angeles. The distance is about 27 miles. Right of way for this distance have been mainly secured, surveys completed, and it is now understood that the company will shortly be in the market for equipment and supplies. W. S. Hook of Los Angeles is President of the road.

The San Gabriel Valley Traction Co., a proposed suburban electric railroad connecting the cities of Los Angeles and Pasadena, has applied for franchises in Pasadena and for franchises from the county for the connecting route. In Los Angeles mileage rights have been accorded over the routes of the Los Angeles Railway Co., thus gaining an entrance to heart of the city. (April 1, p. 247.)

OMAHA, NEB.—The Omaha Street Railway Co., a trolley road, contemplates making some improvements.

PITTSBURGH, PA.—The West End Traction Co. will build an electric road to Barksville and make other short extensions. The Neville Island Line will be double tracked and extensive improvements made in the rolling stock and track throughout the system. This company is a consolidation of the Pittsburgh & West End, the Pittsburgh, Crofton & Mansfield and the Pittsburgh, Neville Island & Coraopolis electric railroad companies. The West End Traction Co. has filed a mortgage with the Union Trust Co., of Pittsburgh, for $1,500,000, which covers all the lines included in the consolidation, subject to prior mortgages aggregating $850,000.

Ordinances have been brought before the Council for granting franchises to the Monongahela, the Virginia Avenue and the Duquesne street railroad companies.

ST. LOUIS, MO.—The St. Louis County Court has granted a franchise to the St. Louis, Clayton & Creve Coeur Lake Railroad, covering rights of way for connecting lines with the various branches of the Lindell Railway Co. in the county.

TAMPA, FLA.—The Tampa Electric Street Railroad Co. has completed a branch line to the military camp, about 1½ miles from the center of the town.

WAUKEGAN, ILL.—Press reports state that the Bluff City Electric Railway has been sold to W. T. Ball, an Indiana capitalist. The road will be completed from Waukegan to Highland Park, and, it is stated, will be extended to Evanston. A. C. Frost, 108 La Salle St., Chicago, will be Treasurer of the new company, and F. O. Rushing of Chicago will be General Manager.

GENERAL RAILROAD NEWS.

Railroad Earnings.

Showing the gross and net earnings for the periods ending at the dates named:

March 31:		1898.	1897.	Inc. or Dec.
Buffalo, Rochester & Pittsburgh.				
1 month	Gross	$295,754	$252,890	I. $42,864
1 "	Net	93,111	78,967	I. 14,144
9 months	Gross	2,737,667	2,534,094	I. 203,573
9 "	Net	980,636	852,327	I. 128,309
Canadian Pacific.				
1 month	Gross	$2,079,479	$1,528,945	I. $550,534
1 "	Net	753,234	520,213	I. 233,021
3 months	Gross	5,246,704	4,113,963	I. 1,132,741
3 "	Net	1,692,529	1,278,379	I. 414,150
Central of Georgia.				
1 month	Gross	$441,546	$415,312	I. $26,234
1 "	Net	120,583	125,613	D. 5,130
9 months	Gross	4,502,763	4,299,081	I. 203,682
9 "	Net	1,675,255	1,655,205	I. 20,050
Chesapeake & Ohio.				
1 month	Gross	$1,002,788	$1,036,553	D. $33,765
1 "	Net	302,026	283,166	I. 18,860
9 months	Gross	8,918,295	8,089,037	I. 829,258
9 "	Net	2,923,994	2,652,016	I. 271,978
Chicago & Eastern Illinois.				
1 month	Gross	$353,913	$327,092	I. $26,821
1 "	Net	162,343	141,567	I. 20,776
9 months	Gross	3,269,715	2,996,024	I. 273,691
9 "	Net	1,564,605	1,431,136	I. 133,469
Chicago, Burlington & Quincy.				
1 month	Gross	$3,667,667	$2,995,739	I. $671,928
1 "	Net	639,462	477,526	I. 161,936
9 months	Gross	32,800,250	27,022,167	I. 5,778,083
9 "	Net	5,556,469	3,749,474	I. 1,806,995
Chicago, Milwaukee & St. Paul.				
1 month	Gross	$2,916,373	$2,336,326	I. $580,047
1 "	Net	1,180,295	1,010,372	I. 169,923
9 months	Gross	26,102,611	23,204,798	I. 2,897,813
9 "	Net	10,259,715	9,285,372	I. 974,343
Cleveland, Cincinnati, Chicago & St. Louis.				
1 month	Gross	$1,191,679	$1,131,618	I. $60,061
1 "	Net	306,820	327,920	D. 21,100
9 months	Gross	10,772,812	9,863,222	I. 909,590
9 "	Net	2,534,430	2,526,200	I. 8,230
Denver & Rio Grande.				
1 month	Gross	$638,356	$526,786	I. $111,570
1 "	Net	267,890	228,657	I. 39,233
9 months	Gross	6,325,167	5,217,303	I. 1,107,864
9 "	Net	2,512,879	2,105,826	I. 407,053
Erie.				
1 month	Gross	$2,724,933	$2,455,706	I. $331,227
1 "	Net	610,678	557,524	I. 53,154
Lehigh Valley.				
1 month	Gross	$1,405,899	$1,343,680	I. $62,219
1 "	Net	347,702	259,730	I. 87,972
4 months	Gross	5,710,555	5,501,011	I. 204,544
4 "	Net	1,464,696	1,054,288	I. 410,408
Long Island.				
1 month	Gross	$281,550	$261,479	I. $4,763
1 "	Net	36,726	32,371	I. 4,355
9 months	Gross	3,480,262	3,185,046	I. 295,216
9 "	Net	1,061,886	942,776	I. 119,110
Louisville & Nashville.				
1 month	Gross	$1,854,195	$1,694,952	I. $159,243
1 "	Net	561,799	519,646	I. 42,153
9 months	Gross	16,490,677	15,458,213	I. 1,032,464
9 "	Net	5,550,789	5,070,228	I. 480,561
Mexican Central.				
1 month	Gross	$1,186,510	$1,145,263	I. $41,247
1 "	Net	384,341	401,514	D. 17,173
3 months	Gross	3,325,629	3,226,389	I. 99,240
3 "	Net	912,420	1,111,423	D. 199,003
Mexican International.				
1 month	Gross	$310,915	$298,070	I. $12,845
1 "	Net	123,850	125,245	D. 1,395
3 months	Gross	839,726	826,941	I. 12,785
3 "	Net	306,578	335,467	D. 28,889
New York, Ontario & Western.				
1 month	Gross	$308,489	$303,726	I. $4,763
1 "	Net	84,592	79,806	I. 4,786
9 months	Gross	3,037,802	2,945,534	I. 92,268
9 "	Net	918,275	880,234	I. 38,041
Norfolk & Western.				
1 month	Gross	$977,770	$938,516	I. $39,254
1 "	Net	301,013	319,282	D. 18,269
9 months	Gross	8,542,042	7,997,702	I. 544,340
9 "	Net	2,709,627	2,026,372	I. 683,255
Oregon Railway & Navigation Co.				
1 month	Gross	$574,534	$306,883	I. $267,651
1 "	Net	198,034	97,755	I. 100,279
9 months	Gross	4,686,408	3,315,644	I. 1,370,764
9 "	Net	2,130,928	1,441,305	I. 689,623
Pennsylvania.				
1 month	Gross	$5,438,332	$5,064,732	I. $373,600
1 "	Net	1,635,922	1,619,922	I. 16,000
3 months	Gross	15,357,037	14,306,637	I. 1,050,400
3 "	Net	4,147,920	4,039,520	I. 108,400
Pennsylvania Company.				
1 month	Gross	.....	.....	I. $516,800
1 "	Net	.....	.....	I. 412,300
9 months	Gross	.....	.....	I. 1,386,200
9 "	Net	.....	.....	I. 514,600
St. Louis & San Francisco.				
1 month	Gross	$579,208	$526,755	I. $42,453
1 "	Net	216,369	229,057	D. 12,688
9 months	Gross	5,268,665	4,535,270	I. 733,395
9 "	Net	2,254,391	2,009,705	I. 244,686
Southern.				
1 month	Gross	$1,813,373	$1,706,763	I. $106,610
1 "	Net	609,195	549,651	I. 59,544
9 months	Gross	15,692,176	14,682,234	I. 1,009,942
9 "	Net	5,218,256	4,837,549	I. 380,707
Southern Pacific.				
1 month	Gross	$4,616,713	$3,914,000	I. $702,713
1 "	Net	1,558,929	1,239,078	I. 319,851
9 months	Gross	41,791,084	37,449,645	I. 4,341,439
9 "	Net	16,622,978	13,685,490	I. 2,937,488
Union Pacific, Denver & Gulf.				
1 month	Gross	$337,500	$269,509	I. $67,991
1 "	Net	120,800	89,900	I. 30,900
3 months	Gross	962,800	753,142	I. 209,658
3 "	Net	356,201	244,429	I. 111,772
Wabash.				
1 month	Gross	$1,157,542	$936,437	I. $221,105
1 "	Net	369,511	323,535	I. 45,976
9 months	Gross	9,865,579	8,768,412	I. 1,097,167
9 "	Net	3,069,881	2,696,475	I. 373,406
Western New York & Pennsylvania.				
3 months	Gross	$666,908	$614,196	I. $52,712
3 "	Net	176,116	111,524	I. 64,592

BALTIMORE & OHIO.—Default was made May 1 on interest as follows: Main Line sterling loan of 1910, $292,021; first mortgage bonds of the Newark, Somerset & Straitsville, $10,600; Baltimore Belt, $150,000; Akron & Chicago Junction first mortgage bonds, $37,500; payment will be made on the Baltimore & Ohio equipment trust bonds, series A, interest $15,000; Confluence & Oakland first mortgage bonds, interest $3,000; Baltimore & New York, $6,825. (April 1, p. 247.)

BROOKLYN ELEVATED.—Holders of first mortgage bonds of the Seaside & Brooklyn Bridge Elevated, second mortgage bonds and capital stock of the B. E. and second mortgage income bonds of the Union Elevated are notified that the third instalment of 15 p. c. is due and payable at the office of the Central Trust Co., New York, May 9. The second instalment was payable March 7. (Feb. 25, p. 150.)

CENTRAL OHIO (Baltimore & Ohio).—At the annual meeting of the stockholders held at Columbus, O., April 27, a resolution was adopted that D. C. List, William A. Fisher, A. B. Crane, George C. Jenkins and James Sloan, Jr., be appointed a committee to represent the stockholders in the reorganization. They were authorized to ascertain the value of the capital stock, the debts of the company, etc., and the relations to the B. &. O., and later to call a meeting of the stockholders and recommend to them a plan of reorganization. This line runs from Bellaire, O., to Columbus, 137 miles, and was leased to the B. & O. until 1926. Application was made for a separate receiver in December. (Jan. 28, p. 72.)

CENTRAL PACIFIC.—August Belmont, John G. Carlisle and George Coppell, the committee representing the interest of the shareholders in America, have joined the London committee, consisting of F. G. Banbury, M. P. (Chairman), John B. Akroyd, Lord Alwyne Compton, M. P., Daniel Marks and Joseph Price. A large block of United States Government second mortgage bonds became due Jan. 1, and foreclosure proceedings are about to be taken by the Government. (March 25, p. 225.)

CENTRAL WASHINGTON.—This company will be reorganized as the Washington Central Railroad and leased to the Northern Pacific at a rental sufficient to meet the interest charge on new 50-year 4 p. c. gold bonds to be issued at the rate of $15,000 per mile. The principal of the old mortgage debt was $2,150,000, making with the $645,000 of accumulated interest a total of $2,795,000. To meet this, half the amount ($1,397,500) will be issued in new W. C. stock and the rest in new fours. N. P. common stock will then be issued in exchange for W. C. stock. The C. W. was sold under foreclosure to the bondholders Jan. 19 at Spokane, Wash. It extends from Cheney, Wash., to Coulee City, 108 miles. It went into the hands of a receiver Sept. 28, 1895. Prior to this time it was leased by the N. P. Ry. (April 15, p. 286.)

CINCINNATI & MUSKINGUM VALLEY (Pennsylvania Co.)—Coupon No. 36 for six months' interest due Jan. 1, 1889, on the first mortgage bonds will be paid by Winslow, Lanier & Co., New York, after May 1. The annual report states that the suit of Evan J. Henry and others against the C. & M. V., the Pittsburgh, Cincinnati, Chicago & St. Louis and others, which has been pending in the Circuit Court in Hamilton County, O., for more than two years, was dismissed by the consent of all parties at the cost of the P., C., C. & St. L. This dismissal ends all controversy between the stockholders and bondholders of the C. & M. V., and it is improbable that further action will ever be taken toward enforcing the provisions of this lease against the P., C., C. & St. L. The decree of foreclosure in the suit of Charles Moran, Trustee, against the company and others in the United States Circuit Court in Cincinnati still stands unenforced, and the order of sale may, at the request of the complainant, be entered at any time. The directors of the company have appointed John P. Green, of Philadel-

phia, as Trustee to fill the vacancy caused by the death of J. Edgar Thompson and Charles Moran. This road exends from Trinway, O., to Morrow, 148.45 miles, and is operated by the Pennsylvania Co.

COLUMBUS, HOCKING VALLEY & TOLEDO.—Judge Lurton, of the United States Circuit Court, at Columbus, O., has ordered a decree of foreclosure in the case of the Central Trust Co. of New York against the C., H. V. & T. and the Hocking Coal & RR. Co. The mortgage under foreclosure was given to secure $14,500,000, of which $8,000,000 was issued. This road went into the hands of a receiver Feb. 25, 1897, under this mortgage. It extends from Pomeroy, O., to Walbridge, 250 miles, with branches to Athens, Nashville, etc., of 73 miles. Including trackage on other roads, the entire system is 346 miles.

Holders of Car Trust Series A bonds are notified that 35 of these have been drawn for payment at par and accrued interest at the office of the Atlantic Trust Co., New York, on or after July 1.

GALVESTON, LA PORTE & HOUSTON.—The effort to sell this road at Galveston, Tex., May 3 proved a failure. The only bid was for $350,000 by George C. Holt, Woodstock, Conn., which was $150,000 less than the upset price. (March 4, p. 171.)

KANSAS MIDLAND.—The decree of sale of this road names Wichita, Kan., as the place of sale, and the upset price $500,000. Under the laws of Kansas, three years must elapse before the sale can take place in the absence of a petition by a majority of the bondholders praying the court to permit an earlier sale. No such petition has been presented and it is doubtful that one will be, so that the date of the sale may not take place for three years. The line extends from Wichita, Kan., to Ellsworth, 107 miles, and until July 1 last was operated under lease by the St. Louis & San Francisco, since which time it has been in the hands of a separate receiver. (March 18, p. 209.)

OGDENSBURG & LAKE CHAMPLAIN.—This road was sold under mortgage by W. H. Comstock, of Utica, N. Y., Special Master, at Ogdensburg, N. Y., May 2, for $2,500,000. The purchasers are Charles Parsons, Receiver of the road; Charles R. Batt, President of the National Security Bank, Boston, and William Lummis, of New York, representing the first mortgage bondholders. In accordance with the terms of the sale, 10 p. c. of the purchase price was deposited. A protest of sale was filed by W. A. Sheppard, of Boston, representing the income bondholders, who asked a postponement of 30 days, owing to the present depression. This line extends from Rouse's Point, N. Y., west to Ogdensburg, 118 miles. It was leased in perpetuity by the Central Vermont June 1, 1886, but the interest on the bonds has been defaulted since April 1, 1896. Charles Parsons was made receiver March 21, 1897. (Feb. 25, p. 150.)

OHIO SOUTHERN.—Judge Ritchie, at Lima, O., April 23, granted decision in the case of the first and second mortgage bonds that all bonds issued under the first mortgage are liens against the entire road with the extensions, and that the second issue of $2,800,000 of second mortgage bonds are liens against the entire road subject to the lien of the first mortgage. The second mortgage bondholders claim that the $1,800,000 bond issue under the first mortgage to be used in payment for extensions of the road do not constitute a lien beyond the original termini and that they were illegally issued. The counter claim of the first mortgage bondholders was that this second issue of the first mortgage, together with the first issue, amounting to $3,924,000, constitute a lien on the entire road, and this view is sustained by the courts. The line extends from Springfield, O., to Wellston, 118 miles, and from Springfield to Lima, 68 miles, with branches aggregating 80 miles. It went into the hands of a receiver May 9, 1895. (March 25, p. 226.)

SCHUYLKILL & LEHIGH.—At the meeting of the Directors at Philadelphia, April 30, it was voted to increase the company's capital stock from $50,000 to $600,000 to cover indebtedness of about $500,000, advanced by the Philadelphia & Reading for improvements on the S. & L. The S. & L. runs from High's Farms, Pa., to Slatington, 44 miles. It is leased by the P. & R. Ry.

ST. CATHERINES & NIAGARA CENTRAL.—This road has been advertised to be sold for the bondholders on June 28. It extends from St. Catherines, Ont., to Niagara Falls, 12.35 miles. It was organized in 1887 and opened Dec. 20, 1888. The capital stock outstanding is $121,150, and the funded debt $240,000. It went into the hands of the receiver June 9, 1897.

ST. LOUIS, MO.—Mr. F. B. Brownell was recently appointed Receiver of the People's Railroad Co. in place of Mr. Charles Green. The People's Railroad is a cable road, and the company was chartered in 1859. Ten miles of track are operated. The capital stock is $1,000,000, of which $300,000 is issued. There are $125,000 of first, $75,000 of second and $800,000 of consolidated mortgage bonds outstanding. Mr. Green was appointed receiver March 7, 1897. He had been president of the road for ten years. The men who are interested in bringing about a reorganization of the road are in favor of changing the motive power to electricity.

SOUTHERN PACIFIC.—The consolidation of certain California companies (April 22, p. 302) is under the name of the Southern Pacific Railroad Co. of California. The old companies with their mileage are as follows:

	Miles.
Southern Pacific Ry. of Cal.	1,970.00
Northern Railway	379.15
Northern California Railway	53.72
California Pacific	113.51
	2,516.38

The consolidation was effected April 14. (Official.)

SOUTH ATLANTIC & OHIO.—This road was sold under foreclosure April 26 at Bristol, Va., for $205,000 to Messrs. Clark and Clyde, representing the bondholders. In accordance with the terms of the sale, $50,000 was paid down and the balance will be paid as soon as the sale is confirmed and accounts adjusted. The various interests have not yet determined upon a plan of reorganization. The line extends from Bristol, Tenn., to Big Stone Gap, Va., 71.09 miles. It was opened May 1, 1890, and a receiver appointed Aug. 8, 1892. (March 25, p. 226.)

UNION PACIFIC.—Holders of all mortgage bonds and interest coupons issued by the Eastern Dision, known as the Middle Division bonds, of June 1, 1866, are notified that payment on the bonds and coupons will be made by the Mercantile Trust Co. of New York on May 16. Bonds without coupons will be paid at $1,225.98, and coupons at face value with interest.

President Burt announces that the Rattle Snake Creek Water Co. and the Wood River Improvement Co., two auxiliary companies of the U. P., have emerged from the receivership and come under the control of the reorganized company. The property of the Rattle Snake Creek Water Co. went into the hands of the receivers Jan. 15, 1894. All of the stock and bonds are owned by the U. P. The Wood River Improvement Co. went into the hands of a receiver when the U. P. was taken, Oct. 13, 1893. The company built the Kearny & Black Hills Ry., and most of its stock is owned by the U. P. (April 29, p. 318.)

VENTURA & OJAI VALLEY.—The Southern Pacific assumed control of this road on May 1. The V. & O. V. was completed in February, and runs from Ventura, Cal., north 18 miles to Nordhoff. Ties, rails, rolling stock, etc., were furnished by the Southern Pacific, that company taking 6 p. c. bonds of the new road in payment. The consolidation will result in the retirement of several officials.

WEST VIRGINIA & PITTSBURGH.—Senator Johnston N. Camden and Clarence Carey have been appointed receivers of this road. The W. V. & P. was leased Jan. 1, 1890, to the Baltimore & Ohio, which guarantees interest on the bonds and applies 37½ p. c. of the gross earnings to this purpose. Default was made in the interest by the B. & O. on April 1. (April 8, p. 268.)

WISCONSIN CENTRAL.—To the petition of Mark T. Cox, of Morristown, N. J., who claims that the Central Car Co., of which he is a stockholder, has suffered losses under the Wisconsin Central receivership, the receivers have filed reply in which they allege that they have never adopted the lease of the Central Car Co. which was in force previous to the time of their appointment in 1893, but that all rentals were paid up to April 1, 1897, at which time a new lease was entered upon. The receivers are still retaining possession of all equipment of the Central Car Co. except in so far as some has been destroyed or injured, and none of this has been replaced since the beginning of the receivership. This rolling stock is estimated now to be worth $1,898,696, and was originally valued at $3,000,000. (April 22, p. 302.)

Electric Railroad News.

BROOKLYN, N. Y.—The gross earnings of the lines of the Brooklyn Rapid Transit Co. are reported as follows:

Month of April—	1898.	1897.
Passenger earnings.		
B. H. R. R. & B. Q. Co. & S. R. Rs.	$470,780.00	$422,295.75
Other earnings from operation	21,022.12	15,519.15
Gross earnings	$491,802.12	$437.814.90
Ten months ending April 30, 1898—		
B. H. R. R. & B. Q. Co. & S. R. Rs.	$4,388,008.41	$4,156,780.01
Other earnings from operation	180,807.83	178,352.35
Gross earnings	$4,568,816.24	$4,335,132.36

BROCKTON, MASS.—The Brockton, Bridgewater & Taunton Street Railway Co. has applied for authority to increase its capital stock from $225,000 to $275,000. The company has in view an extension to New Bedford. (Jan. 28, p. 71.)

CHICAGO, ILL.—Geenral John McNulta, Receiver of the Calumet Electric Street Ry. Co., filed a petition April 28 before Judge Showalter of the U. S. Circuit Court asking permission to expend $60,000 in the improvement of the plant in buying additional property for a temporary loop and transfer station at Sixty-third St. and Stony Island Ave. The petition was granted. (April 8, p. 266.)

DETROIT, MICH.—The Detroit, Fort Wayne & Belle Isle Railway Co., the successor to the Fort Wayne & Belle Isle, has filed a mortgage for $1,200,000 to secure its issue of 5 per cent gold bonds due in April, 1927. The new loan will be used in part to refund $345,000 old first mortgage bonds, and in part to meet the cost to the present owners of acquiring the property. J. C. Hutchins is President of the company, and A. E. Peters is Secretary. Both are interested in the Detroit Electric and the Detroit Citizens' companies.

LOS ANGELES, CAL.—The sale to the highest bidder of the Pasadena & Los Angeles Electric Railway Company took place in Los Angeles, Cal., April 27th, in accordance with the plan of the Reorganization Committee of the bondholders. The franchises and the entire plant was sold to Don C. Porter of Pasadena, Cal., acting as a representative of the Reorganization Committee, for $150,000. The bonded indebtedness of the road is $350,000. A majority of the bondholders had previously signed the agreement.

The directors of the Los Angeles Railway Co. will, on May 18, vote on a plan for increasing the capital stock. An increased bonded indebtedness is contemplated in order to take up outstanding obligations, and increased stock capitalization is required under the law to keep pace with increase of bond issue.

MANCHESTER, N. H.—The Manchester Street Railroad was recently sold to Messrs. Tucker, Anthony & Co., 53 State St., Boston. William A. Tucker has been elected President and P. L. Saltonstall Treasurer. The directors are Walter Parker, President Manchester National Bank; Charles Means, Agent Manchester Locomotive Works; E. P. Shaw, Jr., W. A. Tucker and P. L. Saltonstall. The road operates 20 miles of track.

SHELBURNE FALLS, MASS.—The Shelburne Falls & Colrain Street Railway Co. will build an extension to Buckland and to complete which a bridge will be necessary across Deerfield River.

PETERSBURG, VA.—W. P. McRae has been appointed receiver of the Petersburg Electric Railway Co.

SPRINGFIELD, MASS.—The Springfield Street Railway Co. has been authorized to issue increased stock to the amount of $291,700 for the purpose of capitalizing its floating debt and expense incurred by additions to plant. The company petitioned for authority to increase the capital stock $300,000. The stock will be issued in $150 shares.

TRAFFIC.

Traffic Notes.

Exports of grain from Baltimore during the month of April amounted to about 8,000,000 bushels.

Market gardeners of Calverton, L. I., have arranged for refrigerator cars in which to ship cauliflower to Chicago, Cincinnati and other Western cities.

The Merchants' Association of Indianapolis, composed of 35 retailers, has made an arrangement to pay the fare of customers coming from country towns in Indiana during the May music festival. Railroad fare will be refunded to any visitor who makes aggregate purchases from members of the Association amounting to $25.

The New York, Ontario & Western has reduced local passenger fares from three cents a mile to two cents throughout its lines. This action abolishes all reduced rate tickets heretofore in use, and is taken to avoid compliance with the new State law requiring the issue of 500-mile tickets for $10.

The rate for the transportation of coal by water from Philadelphia to Boston has advanced, on account of the dangers of war, to $1.25 a ton, about 50 cents more than the rate which prevailed a few months ago when very large contracts were made running for nearly or quite a year; and it is said that some shippers will have to get large contracts abrogated or else suffer a great loss.

The Wabash and the Rock Island are to run a sleeping-car through between St. Louis and Colorado Springs. The time west-bound will be 26 hours 10 minutes. The Illinois Central has put on an express train from St. Louis to Chicago, starting at 12.30 p. m. and running through in eight hours. The Lehigh Valley and the Philadelphia & Reading are to run sleeping-cars through between Buffalo, N. Y., and Washington, D. C. The time through is 15 hours.

By reason of the war risks and the withdrawal of some vessels from American trade, the rates on grain from New York and other Atlantic ports to Europe have risen nearly or quite 100 per cent. The rate per quarter from New York to Cork for orders this week was 5s. Berth quotations, New York to Liverpool, per bushel, 5d.

Government transportation orders are now accepted by conductors on the Pennsylvania Railroad from members of the National Guard traveling in New York, Pennsylvania, New Jersey, Maryland, Delaware and Virginia, and it is not necessary to exchange the orders for tickets.

Chicago Traffic Matters.

Chicago, May 4, 1898.

Gulf competition no longer troubles the eastbound roads from Chicago, as owing to the war with Spain exports and other business from points in the West destined to the seaboard is seeking the direct all-rail routes.

The grain shipments from this city by the lake routes during April reached unprecedented figures, the grand total for the month being 30,652,089 bushels.

The warring transcontinental lines may settle their troubles over Alaska rates this week, another joint meeting having been called. The Klondike travel for the season has not been 25 per cent. of what some passenger men anticipated.

The Western railroads have finally agreed on a one cent rate for the transportation of troops to State encampments.

The Western Passenger Association has approved excursion fares for the important summer conventions, and, with one or two exceptions, the rates fixed were a single fare for the round trip plus $2. The largest conventions for which this rate will apply are the Christian Endeavor, at Nashville, in July, the National Encampment of the Grand Army at Cincinnati in September and the National Educational meeting at Washington in July.

The St. Paul road on May 8 will restore the rate on provisions from Kansas City to Chicago to the old tariff, 23 cents. On export provisions the road will continue the 7-cent rate, Kansas City to East St. Louis.

The Burlington has cancelled its low meat rates from Missouri river points, a practical withdrawal from the business until a restoration is brought about.

The Western Passenger Association has raised the price of the interchangeable mileage credential used by its bureau from 50 cents to $1.

Eastbound shipments, exclusive of live stock, from Chicago and Chicago junctions to points at and beyond the western terminus of the Trunk lines for the week ending April 28 amounted to 108,957 tons, as compared with 92,842 tons the preceding week. This statement includes 42,545 tons of grain, 8,370 tons of flour, and 23,306 tons of provisions. The following table shows the quantities and proportions carried by the respective roads:

	Week Ending April 28.		Week Ending April 21.	
Roads.	Tons.	P. C.	Tons.	P. C.
Baltimore & Ohio	18,599	17.1	20,757	22.4
C., C., C. & St. L.	6,378	5.9	4,307	4.6
Erie	15,690	14.4	9,443	10.2
Grand Trunk	5,320	4.9	7,934	8.5
L. S. & M. S.	12,930	11.9	9,831	10.6
Michigan Central	13,623	12.5	10,017	10.8
N. Y., C. & St. L.	6,675	6.1	4,765	5.1
Pitts., C., C. & St. L.	6,993	6.4	6,479	7.0
Pitts., Ft. Wayne & Chi.	14,609	13.4	11,779	12.7
Wabash	8,140	7.4	7,530	8.1
Totals	108,957	100.0	92,842	100,0

Lake shipments last week were 160,226 tons.